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CONTENTS

ORIGINAL ARTICLES

H. A. H. BOUMAN, M. D.—The Early Diagnosis of the Malignant Thyroid—Especially Carcinoma 105
W. F. BRAASCH, M. D.—Recent Advance in the Diagnosis of Surgical Lesions of the Kidney 112
E. M. HAMMES, M. D.—Lethargic Encephalitis 118
FRANK M. MANSON, M. D.—The Treatment of Empyema by a Closed Method 124
A. C. STRACHAUER, M. D.—A New Operation for Pyothorax: The Trephine Operation 127
F. W. WITTICH, M. D.—The Correlation of Laboratory with Clinical Methods in the Study of Tuberculosis 133
EDGAR T. HERRMANN, M. D. Epidemic Influenza 139

(Continued on Advertising Page III.)

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ORIGINAL ARTICLES

THE EARLY DIAGNOSIS OF THE MALIGNANT THYROID—ESPECIALLY CARCINOMA.

BY H. A. H. BOUMAN, M. D., F. A. C. S.
Minneapolis, Minn.

The thyroid gland originates in front of the so-called tuberculum impar of His from which the the foramen caecum is formed by an evagination of epithelium of the anterior pharyngeal wall. This is in the mesobranchial field at the level of the second branchial arch. From it, leading through the root of the tongue, toward the thryoid bone is a depression which grows to be the epithelial-lined thyroglossal duct.

Occasionally the evolution of this structure or tract does not run its normal course. It may remain patent or its epithelial cells may grow irregularly, so that islets of thyroid cells are present to become the future beginnings of possible goiters or tumors. Similar tracts of epithelium are to be found reaching from the dorsal culdesac of the third branchial groove, to the ventral culdesac of the third and fifth branchial grooves, where the upper and lower parathyroid and the thymus postbronchial bodies are formed.

"The thyroid," "passes through three different stages: (1) the embryonic, or thyroglossal stage; (2) the fetal stage, still colloid free constituting an undifferentiated cellular mass; and (3) the adult, or vesicular stage."

These few remarks will suffice for orientation as to the origin of the various cells of which the malignant tumors are composed. It is not so easy to separate the malign from the benign growths. Various forms of carcinoma of the thyroid may enlarge expansively for a period of months. That constitutes their intracapsular period. The stamp of malignancy is upon any given tumor in a given organ when it gives rise to metastases and when growth is accelerated without any apparent reason. The secondary tumors of malignant goiter have a characteristic and peculiar tendency to reproduce physiologic thyroid, so much so that the metastatic growths may take on full function after extirpation of the gland itself.

TABLE I.
MALIGNANT TUMORS OF THE THYROID GLAND

1. Epithelial in Origin (Carcinoma)	2. Arising from Connective Tissue (Sarcoma)
Proliferating Goiter, or Malignant Adenoma.	Fibrosarcoma.
Carcinomatous Goiter.	Round Cell Sarcoma.
Parastruma (Kocher)	Myxosarcoma.
Postbranchial Goiter (Getzowa.)	Endothelioma.
Papilloma.	Perithelioma.
Metastatic Colloid Goiter.	Polymorphous Cell Sarcoma.
Cancroid.	

The history of cancer of the thyroid is intimately connected with that of goiter. A map drawn of the various countries to show the prevalence of goiter would serve also to visualize the frequency of *struma maligna*. The incidence of benign tumors and that of malignant growths undergo parallel oscillations. Where goiter abounds, cancer of the thyroid is frequent. "Lyon, says Carrel[2], is favored with many malignant strumae, from twelve to fifteen a season." Delore[3] saw forty cases in the same clinic in three years. The explanation of this frequency is found in the fact that the city is situated in a goiterous country, and also because the work of its many surgeons called attention to the pathology of the thyroid gland, so that the malignant cases became better recognized.

In 1907 Kocher[4] reported the occurrence of about 400 cases of malignancy in something more than 4,500 operated goiters. He, the great master of goiter work, complains bitterly that the diagnosis of malignant disease is made too late, when with a little more search, care, and understanding the situation could easily be otherwise.

Judd[5] encountered 5 cases of sarcoma and 105 cases of carcinoma from 1905 to 1916. In an extensive report Muller and Speese[6], of Philadelphia, make the following statement: "Malignant disease of the thyroid gland is not a common disease in this country, where only 11 sarcomata have been reported."

In an effort to ascertain its incidence locally, the author has made inquiry of eight leading surgeons in Minneapolis and St. Paul who reported[7] 22 proved cases during the last five years.

Women have goiter far more often than men; the incidence of cancer is likewise greater in women. Muller and Speese give the ratio as 3:2; Delore, 4:1; Orcel[8], 14:6; Carrel-Billard[9], 5:3.

The most favorable age for the incidence of

cancer of the thyroid is from 40 to 70. In 102 cancer patients Carrel found 2 below the age of 20, and 7 more than 70 years of age. Gruie and Bard[10], who describe latent cancer, *cancer medical*, did not find it in a single patient under the age of 50. Lucke[11] reports a sarcoma in a patient 3 years of age; Delore reports one at 16 and another at 15 years of age.

TABLE II.

MALIGNANT TUMORS OF THE THYROID

Cases of Erhardt, and Muller and Speese.

Age of Incidence	Carcinoma	Sarcoma
1 to 10 years	0	0
10 to 20 years	5	2
20 to 30 years	14	10
30 to 40 years	34	12
40 to 50 years	44	30
50 to 60 years	50	30
60 to 70 years	28	24
70 to 80 years	4	2
80 to 90 years	1	0

A total of 290 cases, 213, or 73.5 per cent occurring after the age of 40 years.

The malignant struma, then, develops only occasionally at the age of puberty; the veritable period begins toward 40 and extends to 70, with the maximum frequency around the age of 50.

The metastases of tumors of the thyroid, whether of epithelial or connective tissue origin, take place, not, as usual, sarcoma by the blood vessels and carcinoma by the lymphatics, but their dissemination occurs without choice by either channel.

TABLE III.

MALIGNANT TUMORS OF THYROID GLAND

General Metastases in 238 Cases of Erhardt, and 19 Cases of Muller and Speese

Location	Carcinoma	Sarcoma
Bones	49 (29%)	24 (18%)
Lungs	72 (48%)	65 (42%)
Liver	5	16
Kidney	14	10
Brain	7	7
Pleura	12	6
Myocardium	1	4
Adrenals	1	2
Pericardium	1	0
Spleen	0	1
Omentum	3	0
Intestine	1	0
Ovary	1	0
Mamma	1	0
Stomach	1	1
Esophagus	1	0

TABLE IV.

REGIONS OF METASTASES IN BONES

In 65 Cases of Erhardt and 10 Cases of Muller and Speese.

Skull	31	Humerus	10
Inferior Maxilla	39	Pelvis	9
Sternum	18	Scapula	4
Vertebrae	16	Clavicle	1
Ribs	12	Palate	1
Femur	11		

TABLE V.

COMPARATIVE BONE METASTASES (KOCHER.)

Incidence in Stomach Cancer	0.9%
Incidence in Uterus Cancer	5.7%
Incidence in Esophagus Cancer	2.2%
Incidence in Thyroid Cancer	36.9%

"At the Lyon Clinic," says Carrel Billard, "the patients often observe some infectious disease just about the time of the development of the malignancy. Many times an enlargement of the neck starts after an attack of la grippe."

"This influence of infection is real," asserts Carrel, "We do not believe that it is a mere coincidence."

Poncet[12] in the same clinic had observed long before the existence of an intimate relationship between some inflammatory condition of the pharynx or tonsil and certain tumors of the thyroid.

It is not common for a neoplasm to start in a healthy thyroid; usually it grafts itself upon a previous goiter more or less ancient. Carrell found pre-existent goiter in 75 per cent of his cases. In 11 cases out of 14 Delore found it superimposed on goiter; while Erhardt[13] and other authors give similar proportions. Muller and Speese, quoting Erhardt, state that goiter had existed from 1 to 10 years in 33 cases; from 10 to 20 years in 21 cases; from 20 to 30 years in 16 cases; from 30 to 40 years in 9 cases; and from 40 to 50 years in 9 cases. Van Straaten[14] in 72 cases saw 30 cancers in the right lobe, 20 in the left, and 2 in the isthumus.

TABLE VI.

MALIGNANT TUMORS OF THE THYROID

Superimposed on Pre-Existing Goiter

Of 200 Cases of Erhardt and 42 Cases of Muller and Speese Goiter existed previously in 82, 3.4, per cent

Goiter had existed from 1 to 10 years in 33 cases.
Goiter had existed from 10 to 20 years in 21 cases.
Goiter had existed from 20 to 30 years in 16 cases.
Goiter had existed from 30 to 40 years in 9 cases.
Goiter had existed from 40 to 50 years in 3 cases.

Sometimes the whole gland becomes involved in a rapid malignant degeneration, a process clinically known as acute cancer. Bertrand,[15] Rollet,[16] and Rabe[17] describe the occurrence of this condition in younger individuals. Tumors may occur outside of the thyroid region wherever there are embryonic remnants.

Concerning the histology of the epithelial tumors, we may follow the grouping by Langhans[18] whose magnificent researches have been accepted abroad by Kocher, and in America by Crotti. From a few plates after Langhans the following classification is made:

1. *Struma proliferans.* The nodes are large and rounded, 10 to 15 cm. in diameter. They are encapsulated, and in the center is a stellate scar. The bulk is composed of cells in polyhedral fields or in narrower radiating stripes. Within these fields or stripes are septa of chink-like vessel lumina. The growth is a continued change; segregating groups occur; acini form with lumina having a colloid filling and a single epithelial cell lining; or it may be a colloid ball appears first, around which the cells align themselves. After the cell arrangement is completed, the stroma follows, so that a screen-like appearance results. The tissue so formed resembles normal thyroid parenchyma and is almost identical with colloid goiter. The cell groups, the arrangement of the new acini, the peculiar stroma, are the salient features. Langhans denies frequent invasion of the lymph gland,

while Kocher expresses the opposite opinion. Langhans always finds invasion of the neighboring parenchyma within the gland.

2. *Carcinoma.* This is so called because these tumors show the same characteristics as to relation of cells and stroma as seen in the cancers of the breast and of the stomach. There is the same lawless and irregular ingrowth of epithelium into the connective tissue stroma. On section the cell nests appear in the more or less loose connective tissue; the softer they are, the thinner and more scarce is the stroma,—the medullary type. When the connective tissue is markedly heavy and the cell nests are few, it is termed scirrhus. Metastases occur early and occur in the glands of the neck and the bronchial and mediastinal glands.

3. *Metastatic Colloid Goiter.* No sign of neoplasm is seen in the colloid goiter itself. Capsule, blood vessels, lymph channels are found intact. The malignancy lies in the metastatic growths in the bronchial glands and the mediastinum. These cases often come to autopsy without previous operation or diagnosis.

4. *Parastruma.* Ten cases of parastruma are reported by Kocher. Tumors of the parathyroids contain glycogen. *The colloid is absent.* Large clear cells with the nuclei at the free pole are characteristic. They originate in the squamous epithelium lining the canals connecting the parathyroids and the thymus, and persisting within the parathyroids.

5. *Postbranchial Goiter.* A large cell, small alveolar struma, described by Getzowa[18] arises from postbranchial body cells. The metastases in the lung and in the liver show the same structure.

6. *Papilloma.* The nodes are smaller than in any other form of malignancy. There are hollow spaces, 2 mm. in diameter, into which the papillae grow. The cells are cubical, cylindrical, or may even be squamous in type. On the papillae the cells are tall and large, but on the walls of the spaces are flat. The structure looks like a cyst from the wall of which the papillary tree grows inward. The cylindrical cells look much like the tall cells in the hyperplastic acini of Graves' disease, which may explain the occasional occurrence of Basedow's symptoms with this type of cancer.

7. *Cancroid.* According to Crotti, this tumor never reaches very large proportions; it is hard and has an irregular surface; it has the same appearance histologically as cancroid of the skin, mouth, or other organs. Broad, solid cords of irregular size and form are embedded in a more or less loose connective tissue. The cells are polyhedric, with abundant protoplasm. Cancer pearls are numerous. According to Langhans, they originate from the thyroglossal tract remnants.

It seems reasonable to assume that invasion by a neoplasm would cause some change in the secretion of the thyroid gland. Renaut[19] speaks of these changes as adulterations. Hyperthyroidism and dysthyroidism have been observed. Suppression and hypothyroidism are not observed because the metastatic growths take up the function of the thyroid gland. Signs of hypothyroidism have been noted in such cases only after extirpation of the metastatic process.

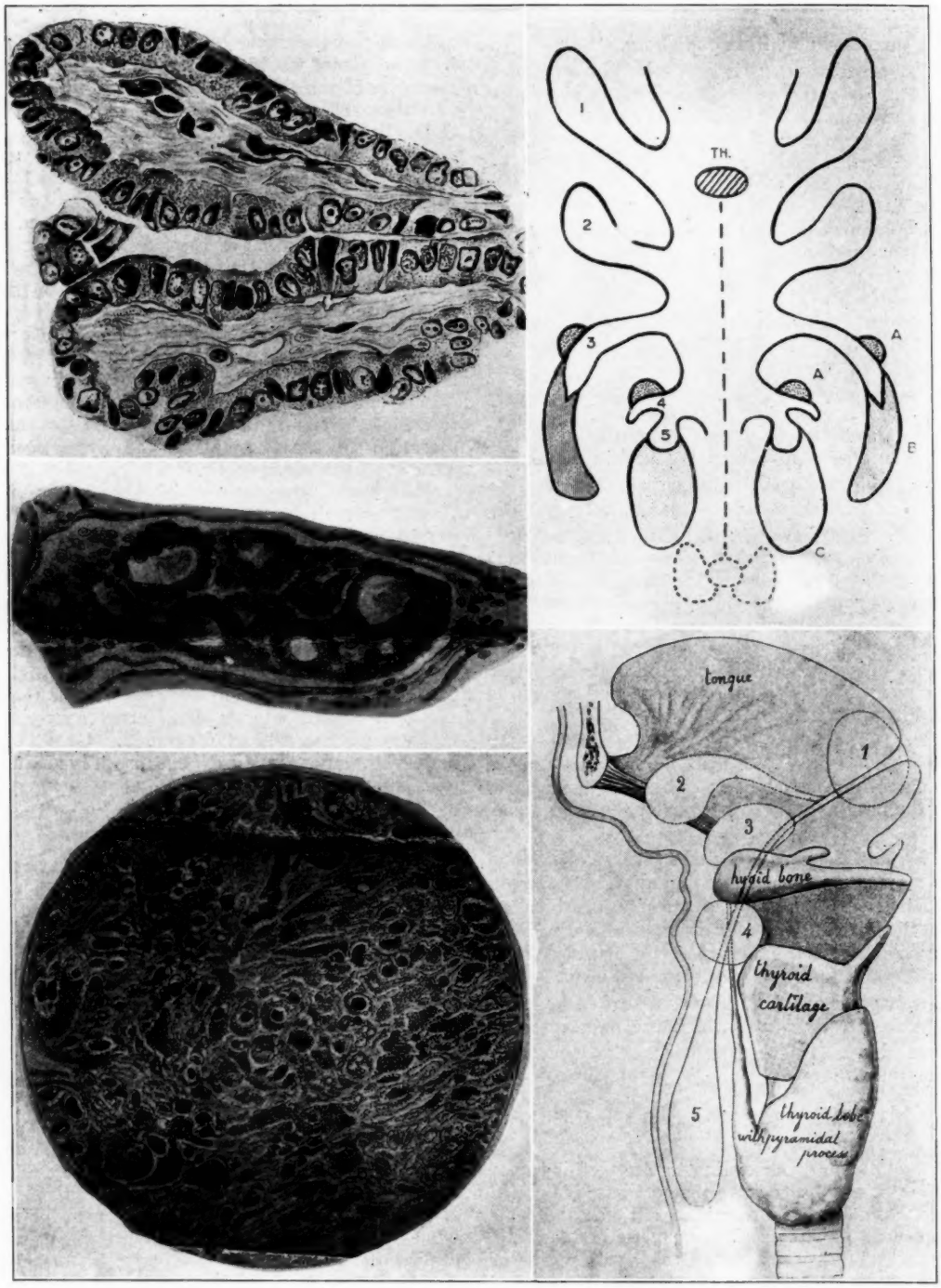
Renaut has shown that the secretions in newly formed follicles is not the same as that in the old ones. The former does not take up much eosin, and is identical with the material found in the thyroid of a fetus of six months. Renaut calls it thyromucoin, and the substance of a normal gland, which corresponds in every sense to colloid, he names thyrocolloine. Kocher calls attention to the resemblance of hyperplastic goiter to some cancer cells.

The general symptoms which accompany malignant goiter present a special physiognomy in accordance with the functional transformation of the gland. Such signs are cardiovascular disturbances, tremor, exophthalmos, and rapid loss of flesh. Surgically the subject may be considered under two heads: (1) the intracapsular stage, and (2) the extracapsular stage. Clinically, there are three types: (1) the latent, (2) the acute, and (3) the subacute *struma maligna.*

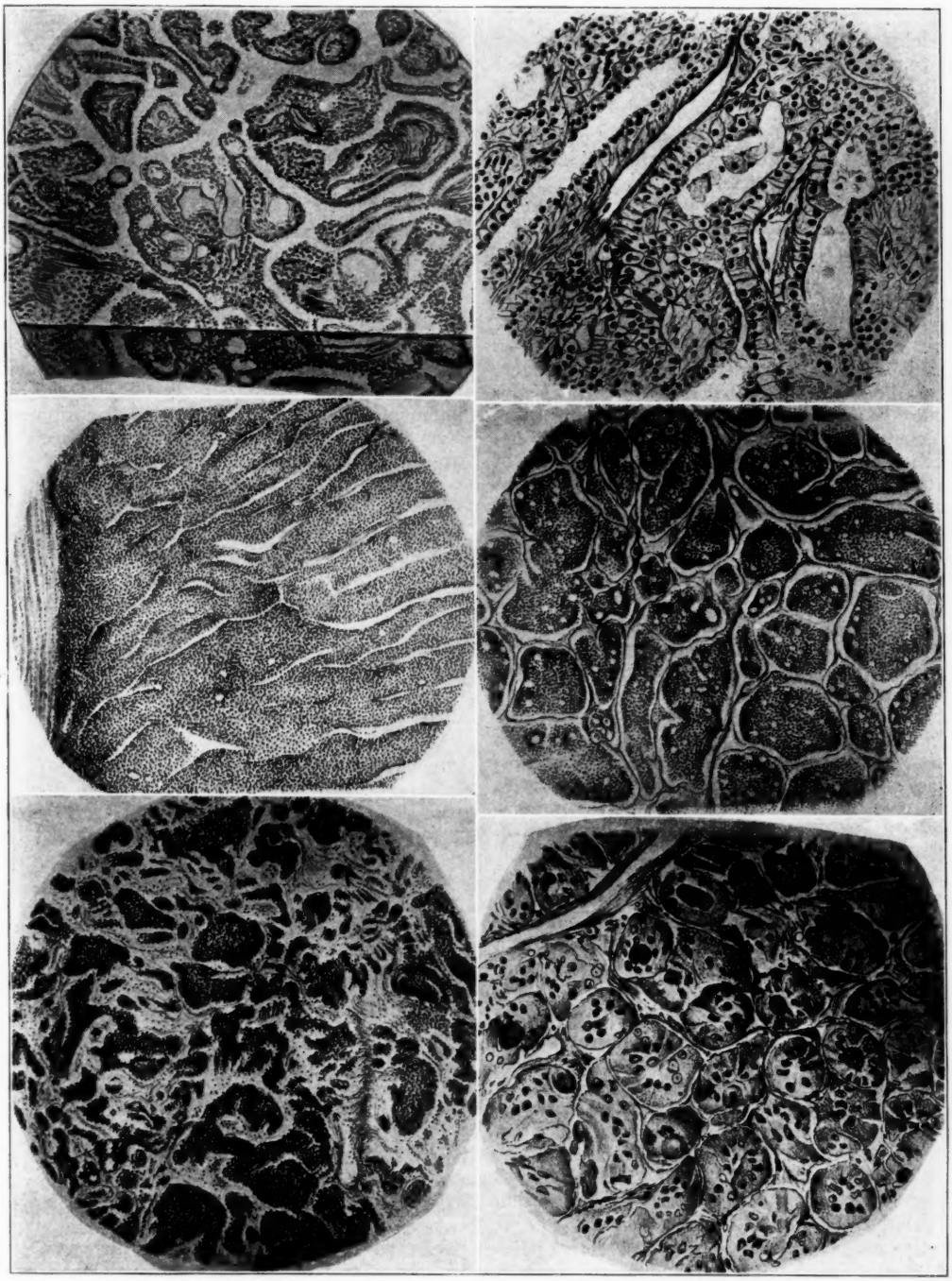
Latent thyrocarcinosis, like latent cancer of the stomach, is seldom diagnosed. Gruie has named it "cancer medical" because it is so often unrecognized and is treated medically until the patient dies from metastasis in the lungs, liver, or bone marrow. He describes the symptoms in nineteen cases, only one of them under 50 years of age. The most frequent symptom noted is a continuous loss of strength, though the patients eat their food with undiminished appetite, and digestion is regular and free from disturbance. Careful questioning usually elicits the fact of the goiter having slightly increased in size as evidenced by an uncomfortable pulling and drawing in that region, but there is absence of pain. The loss of flesh is gradual. By and by some neuralgic pain develops, and some impediment of respiration is experienced, with light attacks of smothering on lying down.

At this stage it is still possible for the patient to take a fair degree of exercise without stopping to recover his breath and, aside from the loss of flesh and strength, he does not regard himself as ill. The most careful search usually fails to disclose any cause for these general symptoms.

Less frequently, but sufficiently often to be noted, distrubances of the heart, such as palpitations and arythmias, occur. The heart beats are usually regular, but suddenly two or three



Upper left, papilloma (high power); middle left, struma proliferans (high power); lower left, carcinoma.



Upper left, papilloma (low power); middle left, struma proliferans (low power); lower left, carcinoma; upper right, parastruma; middle right, struma proliferans (low power); lower right, post-bronchial goitre.

precipitated heart beats come in intermittent fashion. Symptoms simulating angina pectoris are observed. There is no fever, but there may be peculiar disturbances of the nervous system with vertigo, temporary loss of vision, and a perturbed mentality.

In all of the patients lesions of the peripheral nerves are manifested by neuralgic pains, variable in degree, character, and location. There are occipital pains, lumbago, pains like acute pneumonia, and bilaterial neuralgias of the neck and shoulders, the pains radiating from the thyroid. In some of Gruie's patients these troubles persisted until death, while in most of them they disappeared without treatment.

At a more advanced stage cachexia becomes established, which properly is only a more marked degree of loss of flesh and weight. Pallor is marked; the mucous membranes are off color; the complexion is subicteric, but the eyes do not become yellow. Hemorrhage is not noted except through generalizations established in vital organs, such as the lungs or kidneys. Edema of the extremities is an invariable and early symptim. Some patients suffer dysphagia, and experience great thrist, but special features are lacking. There is no leukocytosis.

Local symptoms are often masked by these general manifestations. When goitre existed, the clinicians usually sought to find there the cause for the persistent dyspnea. Gruie has seen the symptoms without being able to detect any outward sign of change in the thyroid gland. In most of the cases a swelling of the gland had become apparent in less than eighteen months. The most important fact noted was the increasing hardness of one or more nodes embedded in the softer parenchyma of the gland. Nootnagel[21] reports the removal of a bilateral cystic goiter in a man nineteen years of age. The frozen section of a single hard nodule he had noted in the left lobe revealed malignancy enclosed in a heavy capsule. There had been no symptoms other than a large cystic goiter.

This type of malignancy in the thyroid gland is well described by Bertrand and Carrel Billard. It means both carcinoma and sarcoma. It is relatively frequent in occurrence, presents a terrible gravity, and kills its victims with extraordinary rapidity. It appears to develop with preference in subjects of from thirty to fifty years of age, and develops either in an old goiter or in patients who had shown no lesion of the thyroid up to that time.

The tumor grows brusquely and becomes painful. In a few days or weeks it doubles or triples in volume, and diffuses itself over the whole base of the neck. It feels like an indurated plaster, or like an enormous hard and irregular mass. Radiating pains appear in the following locations in the order of their frequency: the mastoid, the neck, the face, the shoulder, and the arms.

Respiratory disturbances come on early and, gradually increasing, soon reach great intensity. At night dorsal decubitus is maintained with great difficulty; the patient sleeps sitting up by preference. His sleep is agitated and often he is awakened brusquely with the sensation of smothering, the prelude to actual suffocation.

Regarding deglutition, the patient notices first that he cannot with ease swallow a bolus of food, so he begins to masticate it well and wash it down with some liquid. This symptom is due at first to a spasm, but later on actual impediments are established. The voice at first deepens, grows rough, and is lost on exertion; later on complete paralysis supervenes. The tumor is absolutely immovable. It may break down and suppurate. Very large veins are seen on the neck, over the upper chest, and on the arms.

There is dullness over the anterior mediastinum. Large glandular swellings are present, and thrombosed veins on neck and arms can be palpated. There are metastases in the skull, sternum, or in the lungs with hemorrhagic pleurisies. The skin is reddened and adherent; signs of perforation of the trachea or esophagus may be noted; the patients cough blood and cannot swallow food. Kocher points out that the esophagus and trachea are usually damaged in their musculature only, their immobility being caused by infiltrated tissue which results in distortion on account of the pressing growth.

The general symptoms are rapid loss of flesh and strength. Cachexia, fever and glycosuria may keep pace with the regional troubles, or even overshadow them, and the patient may die from general intoxication before the local process has time to run its course. Symptoms of Graves' disease are not uncommon and are seen as tremor, tachycardia, exophthalmos, and rapid loss of strength. This clinical picture is of interest, but it has no practical value as the disease runs a rapid, fatal course.

An individual of perhaps fifty years of age with an old goiter notices that his goiter, which had been stationary for a long time, begins to expand. He feels some radiation of pain into his head or neck, but often this early stage of cancer evolution is painless. The patient may not grow uneasy, or he may resort to some sort of medication while the affection pursues its course. A case in point is that of a woman who presented herself to an assistant in service at the clinic of Berne one day with a large, one-sided goiter. The only other feature was that the sternum was prominent and seemed to have a tumor on it. It was promptly disregarded and a diagnosis of colloid goiter was recorded.

but had later to be revised by the professor to read: "Sarcoma." Such examples Kocher used with great care to give his pupils lasting lessons.

These tumors present the aspect of an ordinary goiter, and are often accompanied by some respiratory troubles. In the absence of a goiter the disease manifests itself somewhat differently. In the thyroid region there appears a small tumor which at first grows quite slowly, then faster. At the beginning there exist no signs other than the age of the patient, the growth of the tumor, some pains, and a light dyspnea; yet these signs are sufficient for diagnosis if one considers the frequency of cancer and the rarity of goiters in the old.

It is important to grasp this first period as it constitutes the manageable zone of malignant goiter. The pathology is localized entirely within the gland, and generalization at this stage is very exceptional. The apparent benignity keeps the patient from consulting a surgeon. They come when they cannot breathe any more, or when the tumor becomes menacingly large.

The intraglandular zone among most patients was observed by Poncet to be from two to six months, but it may last for two years and surgical intervention still be possible. This apparent discrepancy may be accounted for in the particular variety of the neoplasm and in its degree of malignancy.

When the stage of regional invasion is reached things change; the tumor becomes voluminous, knobby, harder; the patient is thin and pale, and is out of breath on the least effort. Laryngoscopy discloses the compression of the laryngeal nerves; the voice becomes hoarse, and is slowly lost. Respiration is increasingly difficult; a barking cough is often present and, as in acute cancer cases, paroxysmal choking spells make life miserable for the patient. The face and neck are congested, and desperate efforts are made to get breath.

The only diagnosis that counts for the benefit of the patient is the early one, and the prerequisite is the attitude of the physician. When any sort of nodule is encountered in the breast, the first question is not: "What is it?" but we ask: "Why is it not cancer?" Crotti says that the physician should be a cancer maniac. He says further that the satisfied and dangerous optimism which is too often met with finds its excuse in ignorance, and should be discarded and replaced by an alarming pessimism. In that state of mind the physician will catch the significance of any slight physical change in the tumor, and the meaning of any otherwise apparently insignificant symptom. Too often, indeed, these little prodromic symptoms are disregarded, yet they exist! It is for the physician to train his senses to perceive them, interpret them, and utilize them for early diagnosis.

Kocher stated in 1907 that of 500 patients with simple goiter, Graves' disease, and malignant thyroid, combined, he lost only three. This would indicate that the intracapsular and early period of thyrocarcinosis has a favorable prognosis. Kocher says: "Suspicion of malignancy is a categorical indication for operation." Suspicion should be aroused by two signs which may be considered constant: first, the increasing growth, which varies in different patients. Some speak of it as having been steady for several years, more rapid growth being of recent occurrence; in others this period is much shorter, extending back only a few months.

There are patients whose voluminous, rapidly growing tumors date back only a few weeks, so that the picture may resemble subacute inflammation. Constant and without exception is the history of an unmotivated foster growth during a relatively short time in patients of advanced age (Kocher.) At the same time, the general health is good. The patient can do his work, and enjoys a strong constitution. Only in the event of rapid growth are noted the effects of the expansion of the neoplasm, the neuralgias of the third and fourth cervical nerves, the change of voice, the increasing dyspnea, obstinate bronchitis, and increasing difficulty of deglutition.

The second sign of suspicion is the changing consistency of the tumor. The patient will note this symptom. The lump on the neck grows harder all the time. If there is present a large nodule which stands out strongly on one side only, and is circumscribed, yet growing fast (Kocher), is growing harder and still remains quite movable in the course of several months, or even from one to two years, there is reason to diagnose not only malignancy, but even the special form of proliferating goiter, still in the intracapsular zone of evolution.

Large thyroid arteries and dilated veins will confirm the opinion. The light difficulties of respiration and deglutition, the radiating neuralgias of the occiput, ear, and neck are considered as resulting from adhesions (Kocher). The organs cannot get away from the pressure of the neoplasm.

The signs of compression and infiltration denote serious damage,—actual paresis of vocal cords, lesions of the vagus and phrenic nerves, occlusions of blood vessels, changes of trachea and esophagus. With these extracapsular growth is proved.

The variations of character, number, and time of appearance of all these symptoms may lead to the diagnosis of special tumors. The small, slowly growing papilloma has early invaded the glands of the neck, yet symptoms are absent. The parastruma, owing to its intimate connection with the trachea and its downward direc-

tion of growth, causes early involvement of the trachea and esophageal wall and paresis of the recurrent nerve, but the neuralgias are absent; so we find that hoarseness is present and there is difficulty of breathing and swallowing, but no pain.

In the large benign intrathoracic goiters respiration is intensely interfered with. Deglutition suffers in benign goiters only when it is located between the esophagus and trachea. To differentiate sarcoma from carcinoma has not seemed of importance considering the purpose of this paper. Sarcoma grows faster and larger, is softer and not nodular. Hemorrhage in a cystic goiter effects a rapid increase in volume and increased density, which may convey the impression of malignancy. A few days will tell the tale.

Thyroiditis occurs in young individuals and is preceded and accompanied by other signs of acute infection. In the wooden thyroiditis of Riedel[22] signs of compression arise rapidly. It appears in young people, and subsides in one or two months.

Chronic thyroiditis and cancer both infiltrate the neighboring tissue, but the thyroiditis is painless and does not react on the general system.

Tuberculosis and syphilis of the thyroid are very rare, though cheesy nodules may mislead.

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RECENT ADVANCE IN THE DIAGNOSIS OF SURGICAL LESIONS OF THE KIDNEY*

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Recent advance in methods of diagnosis of surgical conditions of the kidney has been largely in the field of roentgenography and renal functional tests. Roentgenography of the urinary tract rendered opaque to the x-ray by injected mediums is now recognized as an indispensable factor in the diagnosis of surgical renal lesions. Its development was retarded during several years by the use of opaque mediums which caused injury to the injected kidney, namely, the salts of colloidal silver. This was largely overcome by the use of thorium as suggested by Burns. The occasional toxicity and the difficulty of preparation of this solution, however, prevented it from being an ideal medium. Although sodium iodid, as suggested by Cameron, obviated these objections, it remained for Weld to discover that ordinary sodium bromid has all the requisites of the ideal medium, since it is thoroughly soluble, non irritating, nontoxic, easily prepared, and inexpensive. As a result, by using this inert medium, pyelography may be employed almost routinely with cystoscopy. There is scarcely a lesion in the urinary tract in which it has not proved of distinct diagnostic value. Since the interpretation of the pyelogram has been quite fully described in recent literature I shall not go into detail concerning the various deformities of the pelvic outline.

With the improvement and standardization of x-ray apparatus as well as operative technic, roentgenographic examination of the urinary tract has become so wide-spread that there are now but few surgeons who do not have access to this invaluable diagnostic aid. In the diagnosis of renal lithiasis much progress has been made in the interpretation of the numerous confusing shadows which appear in the roentgenograms of the urinary tract. Although many of these shadows may be identified by their contour, character, and position, a large number are im-

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possible to interpret without the combined aid of clinical, laboratory, and cystoscopic data. The greatest accuracy, however, can be obtained only through the combined use of the cystoscope and roentgenographic technic, as employed in pyelography. The pyelographic data that will enable us to determine whether a doubtful shadow is extrarenal or intrarenal are as follows: (1) The distance separating the shadow from, (2) the exact relation of the shadow to, and (3) the presence of pathologic changes in the pelvic outline.

Shadows appearing in the area of the urinary tract which most frequently are responsible for error in interpretation are those caused by calcareous deposit in the extra-urinary tissue, gallstones, and tuberculous renal caseation. Such shadows may lead either to needless exploration of the urinary tract, or they may be erroneously regarded as extra-urinary.

It is well known that a gallstone is, as a rule, not visible in the roentgenogram. Nevertheless, as a result of the improvement in roentgenographic technic it is being found with such frequency as to warrant its consideration in the interpretation of every shadow in the right upper abdominal quadrant. The similarity of subjective symptomatology which not infrequently occurs between renal stone and gallstone may render the clinical data of little aid in interpreting such shadows. While the character of the gallstone shadow is distinctive and often is easily recognized, error in interpretation is easily possible. The greatest problem in the x-ray diagnosis of gallstone is to distinguish its shadow from that of renal stone. If the gallstone shadow is situated in the usual position of the kidney, and, should there be a coincidental infection of the urinary tract, the diagnosis may be exceedingly difficult. On the other hand, a renal stone may not infrequently be seen lying well above the twelfth or even the eleventh rib, in the usual gallbladder area. Furthermore, the renal stone may assume characteristics very similar to those of the gallstone. In short, the shadow in the roentgenogram cast by a gallstone and by a renal stone may be identical in position and character. The pyelogram is usually the best and frequently the only method by which the gallstone may be identified. The same data previously named in the identification of the extrarenal shadow are applicable in the differentiation of gallstones and renal stones.

Renal Tuberculosis

Recent literature has emphasized the importance of recognizing shadows caused by calcified areas in a tuberculous kidney. Although they can frequently be identified by their characteristic shadow, the combined clinical and cystoscopic data may be necessary for their recognition. The shadows are of three types, namely (1) small scattered areas caused by lime deposit in the calices, (2) larger shadows of irregular density, some of which may assume the characteristics of renal stone, and (3) casts of a portion or even the entire caseated kidney. It is advisable, therefore, to have a complete roentgenographic examination of the urinary tract in every patient suspected of having renal tuberculosis.

Shadow Localization

It is of value to the surgeon to ascertain as accurately as possible prior to operation the exact location of the stone. Approximate localization of the stone shadow in the original roentgenogram is frequently possible, particularly if the outline of the kidney is distinct. By outlining the renal pelvis in a pyelogram and then comparing the position of the stone shadow with that of the pelvic outline, the stone can be localized more accurately than in the ordinary roentgenogram. The main problem in the localization of the stone is to determine whether it is situated in the true pelvis, in a calyx, or in the cortex.

Although the percentage of error in operations for lithiasis has been greatly reduced, several difficulties still remain to be overcome. The following are the complications which are most frequently encountered at the operating table:

1. Impossibility of an exact interpretation of the roentgenogram.
2. The difficulty of locating the stone in the kidney.
3. Inability to find the stone.
4. The possibility of overlooking one or more stones when multiple stones are present.
5. The possibility of having fragments of stones broken off or loosely connected with the original stone.

Nothing is more disconcerting than the in-

ability to find a stone in the kidney when the various methods of clinical examination have definitely shown it to be there. The kidney usually becomes so congested when brought into the field of operation that searching for a small stone may be exceedingly difficult and often fruitless. Moreover, it may be difficult to determine from the roentgenogram the exact number of stones in a kidney. The shadow may appear to be single when in reality it represents two stones which either overlap or are closely approximated. What appears to be a single branched stone may be made up of several distinct stones. Again, on the removal of a branched or irregular stone, fragments are easily broken off and it may be impossible to locate them. At the Mayo Clinic we have recently made fluoroscopic examinations of the kidney at the operating table, employing small portable x-ray machines which are used by the United States Army. By this method we believe that many of the difficulties accompanying renal lithotomy will be overcome.

Renal Functional Tests

Although the indications for surgical therapy of the urinary tract are usually determined by the clinical, roentgenographic, and cystoscopic data, in many cases renal functional tests may be of considerable diagnostic value, and may largely influence surgical judgment. Tests of renal function are divided into two general types, excretory and retentive. The excretory test is the simpler of the two and is possibly the more valuable. Of the various excretory tests, the use of phenolsulphonephthalein has proved to be the most practical because of the accuracy of its elimination and ease of its administration. The original contentions of the authors, Rowntree and Geraghty, concerning the application of this test, have in the main proved to be correct. In the diagnosis of surgical conditions of the kidney it is used in estimating the renal function of both kidneys as in the combined test, and in the estimation of the secretion from the individual kidney as in the differential test.

Combined Phenolsulphonephthalein Test

The phenolsulphonephthalein test as universally employed consists of the estimation of the dye secreted by both kidneys during two hours following its appearance in the urine after intramuscular injection of 1 c.c. of phenolsulphonephthalein. Its value in certain conditions is unquestionable, but attention should be called to the fact that errors may arise which, unless carefully watched, will largely negate its value. Such errors are of two types, technical and interpretative. If either of these errors occurs, the test is not only worthless, but may even be misleading.

Technical Errors

When the test is employed in a hospital where every step can be carefully guarded and the patient kept under observation during the time of secretion so that the specimen can be completely obtained, the possibility of technical error is not great. However, as generally employed in the dispensary, ambulatorium, office, or at the bedside, the possibility of error is considerable. In our experience errors as follows have been found to occur most frequently:

1. Excessive or insufficient amount of phenolsulphonephthalein placed in the syringe for injection.
2. The loss of a portion of the phenolsulphonephthalein solution from the syringe or needle when it is injected.
3. Abbreviation or extension of the two-hour period of collection on the part of the patient.
4. Loss of part of the urine collected in transferring it into the receptacle from which the estimate is to be made.
5. Retention in the bladder of a portion of the urine secreated either because of a pathologic condition or misunderstanding on the part of the patient.
6. Error in laboratory technic, such as insufficient alkalization, inefficient interpretation of color values, and so forth.
7. Clerical errors.

Because of the many possible sources of error it is evident that a single phenolsulphonephthalein test with less than the normal amount of secretion must be considered worthless unless checked up by a second test.

Errors of Interpretation

Without placing an arbitrary figure which would govern in every case, as a general rule, a patient having a function of less than 30 per cent should be observed very carefully before advising operation. The possibility of retained urine at the time of the test from an overlooked

prostate, diverticulum, sacculated ureter, or hydronephrosis must always be considered. However, even though the phenolsulphonephthalein secretion is lower than 30 per cent, it should not necessarily contraindicate operation. It must be remembered that any renal functional test gives an index of renal activity at the time of examination but not what the kidneys are capable of when pathologic conditions have been corrected. This is particularly true in the presence of lithiasis; the reflex irritation from a stone may lower the function of one or both kidneys to an alarming degree. When, however, the cause has been removed it is not unusual to observe the renal function return to normal.

The assurance derived from a normal combined phenolsulphonephthalein test, when one kidney is definitely proved to be destroyed, is of great value. On the other hand, when the x-ray or clinical examination indicates that one kidney is diseased, it can not be inferred from a normal combined phenolsulphonephthalein test that the other kidney is present and normal. As an illustration; when a limited pathologic lesion such as a small stone, hydronephrosis, or even a limited area of tuberculosis is present in a single or solitary kidney, the combined phenolsulphonephthalein test may be quite normal. If it is inferred from this that another kidney is present the results at operation may be disastrous. The possibility of bilateral disease existing in the presence of a normal phenolsulphonephthalein secretion cannot be excluded since it has been repeatedly noted with bilateral tuberculosis, bilateral renal lithiasis, polycystic kidney, and so forth.

Differential Functional Test

A differential functional test is the method of estimation of phenolsulphonephthalein secretion collected from the individual kidneys by means of the ureteral catheter during a period of from fifteen to thirty minutes following intravenous injection. Primarily the test was used to determine the state of efficiency of the supposedly well kidney. It is, however, of even greater value as an aid to diagnosis of renal lesion. As with the combined test, the possibilities of error in technic and interpretation must be considered. It is necessary that the dye be injected intravenously and not intramuscularly, otherwise the rate of secretion will be greatly retarded. If given intravenously the dye will appear in the urine within four or five minutes after injection, and an average of 15 and 30 per cent is secreted from each normal kidney in fifteen and thirty minutes respectively. The amount of dye, however, it not always constant and may be influenced by hypersecretion in a nervous person, which will cause a much larger amount of dye to be secreted, or by hyposecretion, which may be caused by reflex inhibition of secretion from catheter irritation. Another source of error may arise unless due allowance is made for return flow of the urine alongside the ureteral catheter into the bladder. It is necessary carefully to estimate the amount of dye which is found in the bladder at the end of the fifteen or thirty minute period*. A recent suggestion of one of my associates (Peterson) has proved to be of practical value in this complication. He suggested a so-called "concentration test" which consists of estimating the dye in from 2 c.c. to 5 c.c. of the urine collected from each kidney and making a relative comparison. If the same amount of dye is found in both sides, even though a large amount of return flow urine is in the bladder, we may infer that both kidneys are functionating equally.

The value of methylene blue and indigo-carmin as an aid to ascertaining renal function must, however, also be recognized. As a rough test, particularly when one or both kidneys cannot be catheterized or when it seems inadvisable to do so, it may be invaluable. Thomas has recently added to the value of the blue test by his method of making a quantitative estimate of the dye secreted. It is, however, not of such diagnostic value, nor is it so accurate in ascertaining the degree of renal function as the phenolsulphonephthalein test. It may occasionally be desirable to employ both tests simultaneously. Peterson has shown that the blue color need not interfere with the phenolsulphonephthalein estimate. He overcomes this difficulty by simply alkalizing the urine which removes the blue color and permits an accurate phenolsulphonephthalein estimate.

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*When more than 10 per cent of the total dye secreted is found in the return flow the value of the test is greatly diminished and may even be completely destroyed.

Retention Tests

Estimation of the degree of retention in the blood of metabolic end products such as uric acid, urea, and creatinin has of recent years been placed on a practical basis. This is largely the result of the work of American investigators such as Folin and Denis, Marshall, Myers and Fine, and others. The estimation of the urea nitrogen content of the blood has been most widely employed in surgical conditions of the urinary tract. It is generally recognized that an estimation of 40 mg. of urea nitrogen for each 100 c.c. of blood would indicate a guarded prognosis, and when it reaches more than 100 mg. the prognosis is very grave. More recently it has been found that creatinin when retained in the blood in amounts of more than 2.5 mg. is indicative of renal disease, and when more than 5 mg. are retained the termination is usually fatal.

Retention tests are best employed in conjunction with the elimination tests. They are of considerable routine value in checking the results of the elimination tests and calling attention to possible technical errors in their estimation. Because of inability to obtain complete data of secretion, retention tests may offer the only method with which renal function can be estimated.

Bacteriology

Probably the most important recent contribution to the bacteriology of the kidney is that made by Cabot and Crabtree, who have demonstrated that the clinical course of an infectious renal lesion is largely dependent on the identity of the bacteria. The colon group of bacilli tends to produce non-suppurative renal changes, while the pathogenic bacteria, notably the cocci, tend to produce suppurative nephritis and abscesses. Lesions caused by the colon group are usually non-surgical and, in the early stages, are amenable to treatment, whereas a coccus infection of the kidney is distinctly a surgical condition. The coccus infections usually predominate in the cortex. The importance of making a bacterial investigation of the urine in cases of acute renal infections is self-evident.

The subject of renal infection, particularly as to the path of transmission of the original infection, has in recent years engaged the attention of numerous observers. Sweet, Eisendrath, and others have performed experiments which would go to prove the existence of an ascending or lymphatic route, while Cabot and Crabtree maintain that the infection is always hematogenous. It is probable that both methods of infection may exist although the latter is by far the more frequent. However, all observers are now quite convinced that renal infection is secondary to some other active focus of infection and that it is of primary importance to exclude the possibility of such a focus in the tonsils, teeth, prostate, seminal vesicles, and so forth.

Our knowledge concerning certain phases of renal physiology has recently been considerably augmented. The use of colloidal silver in the renal pelvis demonstrated to us the absorptive power of the renal parenchyma from the pelvis. This has been experimentally corroborated by Burns, and by Weld. It has been demonstrated that phenolsulphonephthalein injected into the renal pelvis is secreted from the other kidney within five minutes. This fact has been taken advantage of in the treatment of pyelonephritis by injecting large amounts of solutions of silver nitrate and other antiseptics into the renal pelvis. It may be inferred that not alone the pelvis will be affected, but the antiseptic solution will enter the renal tubules and come in contact with diseased areas in the parenchyma itself.

Theories as to the probable etiology of symptomless unilateral renal hematuria, or the so-called essential hematuria, have recently been modified. It was formerly thought that this condition was due to a true nephritis or Bright's Type 1 (according to the classification of nephritis by W. J. Mayo.) Recently, however, the condition has been regarded as frequently the result of an insidious chronic infection of the renal papillae. Payne and MacNider, and Buerger have demonstrated that sections of the renal papillae show evidence of infectious changes together with varicose condition of the venous capillaries. It would seem that the circulatory changes in the papillae are the direct result of the infection. This theory is further corroborated by the fact that permanent cessation of hematuria may be brought about by means of injecting strong solutions of

silver nitrate into the renal pelvis. The diagnosis of this interesting condition is rendered fairly exact by demonstrating the outline of a normal pelvis in the roentgenogram and by demonstrating an equilateral normal phenolsulphonephthlein output.

Cystoscopic Technic

The use of the cystoscope has, like the use of the roentgenograph, been widely extended in recent years. Many improvements have been made in the various instruments employed so that its value in diagnosis and treatment of diseases of the urinary tract has been greatly augmented. In the diagnosis of stones in the ureter the wax-tipped catheter which was suggested by Kelly many years ago, and which later fell into disuse, has recently enjoyed a renaissance. The method is as follows: Melted beeswax is placed on a ureteral catheter which is introduced up to or past a ureteral stone. If scratch marks result they should be of considerable diagnostic value. Its practical application, however, particularly with the type of cystoscopes now in vogue, has not proved so satisfactory as it might seem. It often happens, particularly with small stones, that either no scratch appears or it is too indefinite for exact interpretation. Furthermore, scratches caused by the cystoscope may be difficult to identify. On the other hand, the wax catheter, if properly employed, should give data of considerable value.

Hunner has called our attention to the existence of wide strictures or infiltrations of the ureteral wall which have been overlooked in the past. He makes his diagnosis entirely from the obstruction or rather the hang encountered by a large wax bulb as it is passed through the strictured area. The frequency with which such a stricture occurs and the variety of symptoms it causes will make this condition one of primary importance if the findings of Hunner are corroborated by future investigation. The scarcity of pathologic and anatomic confirmation, however, in a measure negates the value of this contribution. Hunner furthermore claims that stones found in the ureter are usually formed in the dilated portion above a stricture rather than primarily in the kidney. Although the suggestion is of considerable interest it, nevertheless, lacks confirmation and seems improbable because of the following reasons: (1) The presence of a strictured area in the ureter below a stone has not been corroborated by other surgeons. (2) Ureteral catheterization following operation fails to demonstrate strictures. (3) The small percentage of ureteral stones that recur even though no attempts are made to treat a stricture.

In conclusion I would say that recent progress in diagnosis of surgical conditions involving the kidney has indeed been considerable. The interest in the subject by both internist and surgeon is widespread since the close relationship of renal diagnosis to that of the surrounding organs is realized by both. Today there are but few medical groups that do not have access to such methods of diagnosis as I have described.

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LETHARGIC ENCEPHALITIS (WITH REPORT OF TWELVE CASES)

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In reviewing the literature, one is impressed with the fact that epidemics of Lethartic Encephalitis and similar symptom complexes have almost invariably been associated with an epidemic of Influenza.

In 1712, Camerarius described sleeping sickness following an epidemic of Grippe. A similar condition occurred in Germany in 1745, in Lyons in 1800 and in Milan in 1802. The south and west portions of Europe were afflicted with a pandemic in 1889-90, followed by a disease at that time known as "Nona," characterized by lethargy and cranial nerve palsies. According to Mauthner, the pathologic lesions found were those of an acute hemorrhagic polioencephalitis. It is of interest to note that during the influenza epidemic in this country occurring at the same time, very little mention is made of any complications of encephalitis. No further epidemics are recorded in the literature until 1917, when a similar disease again devloped in Austria and was fully described by Economo who suggested the term Lethargic Encephalitis. Early in 1918, France and England reported cases with the same symptomatology. Soon after the disease began to manifest itself in this country and at a meeting of the New York Neurological Society in February, 1919, it was recommended at the suggestion of Abrahamson to make this disease a reportable one, because it was becoming so prevalent in that city. Numerous cases have been reported in Chicago by Bassoe and others, and from personal information obtained this condition is occurring more frequently in our own community although in no alarming degree; about 30 cases have been observed in the Twin Cities during the past four months.

The symptomatology varies considerably depending on the localization of the pathological process and the virulence of the causative factor. The onset is frequently acute there may be prodromel symptoms such as general malaise and coryza; occasionally it opens in a fulminant fashion. Lethargy, asthenia, general although mild muscle rigidity and mask-like features have been the most frequent general symptoms in our group of cases. Regardless of the degree of stupor, it is surprising how readily the patient can be aroused, how accurate his responses are, and how promptly, although sluggishly, he will execute a command. The gait, posture and facial expression are often quite typical of paralysis agitans without the tremor. Mental symptoms may occur. Wilson described a case which showed typical "Witzelsuch" through the entire course of the illness. Delusions and hallucinations may be present. Temporary disorientation and confusion are not infrequent. In one of Dr. Riggs' patients, whom I had an opportunity to study, a hypomania alternating with mild depression was observed. One case was referred to me with a diagnosis of the catatonic type of Dementia Praecox. A quite typical picture of a Korsakoff's psychosis was noted in another one of my cases. Headache occurs early during the disease. Loss of bladder control—either involuntary urination or retention, is not infrequent. Symptoms of meningeal irritation such as Kernig's sign and rigid neck are occasionally present although mild. The temperature is very irregular one of our patients ran a normal course throughout, while another one had a temperature around 102°F. for four weeks.

*Read before the Southern Minnesota Medical Society, Dec. 2nd, 1919.

Of the localizing symptoms, the cranial nerves are most frequently involved, especially the oculomotor. The pupils may be dilated or contracted. Loss of the light and accommodation reflex is not uncommon. The patient frequently complains of diplopia. Bilateral ptosis may occur but is often simulated because of the lethargy. The features are expressionless either due to a bilateral involvement of the facial nerves or as a part of the general muscle rigidity. The tongue frequently cannot be protruded beyond the lips. If the palate and pharyngeal muscles are implicated, this is usually of a transient character. The deep reflexes may be normal, increased or absent. Occasionally, one finds a Babinski. Sensory disturbances are infrequent; choreiform movements, tremors, muscular twitchings, paralysis and convulsions rarely occur.

Bassoe attributes the retention of urine and the difficulty in speech and swallowing in most cases to an involvement of the tonus controlling extrapyramidal motor apparatus, which also explains the general rigidity. According to recent investigations, this controlling mechanism is located in the basal ganglia which region is a favorite site for the inflammatory changes of lethargic encephalitis.

Blood examination has been normal throughout except for a mild leucocytosis. All spinal fluid tests have been negative except for an increase of globulin and a moderate pleocytosis, mostly lymphocytes. These practically negative blood and spinal fluid findings accompanying so profound a picture of acute central nervous involvement are quite an important point in the differential diagnosis of lethargic encephalitis.

The duration of the disease may vary from a few days to weeks and months. Recovered cases frequently manifest definite organic symptoms over a long period, such as sluggish pupils, diplopia, a Parkinson's gait and deep reflex changes. Reports regarding the mortality rate have varied considerably. Six out of eleven of Economo's died seven out of fifteen of Netters', two out of thirteen of Wilson's and six out of our own series of twelve cases.

Bacteriological examination of the blood and spinal fluid have been uniformly negative; all ordinary and anaerobic cultures have proved sterile. No recognizable organisms have been detected in the tissues on microscopical examination. However, attention must be directed to two observers who reported definite findings. Von Wiesner injected into a monkey subdurally an emulsion of the brain and spinal cord from one of Economo's patients. The animal died within 46 hours, having manifested symptoms of stupor with paresis of the right hind leg. The monkey's brain showed all the characteristics of an acute hemorrhagic encephalitis, and Von Wiesner was able to culture a gram positive diplostreptococcus from the same. His findings call for further confirmation as his conclusions semed rather unsatisfactory.

Strauss, Hirshfield and Loewe successfully inoculated monkeys with an emulsion of the human brain and produced the characteristic lesions found in Lethargic Encephalitis. They were unable, however, to culture or demonstrate any bacteria. In a later report, they state that a Gram positive organism had been isolated and cultured through twelve generations and that it resmbled those described by Flexner and Noguchi in poliomyelitis.

SPINAL FLUID FINDINGS

Case No.	Day after Onset	Pressure	Globulin	Cell count	Fehlings	Wassermann	Colloidal Gold
1	10	N	trace	27	N	0	Not made
2	7	N	0	6	N	0	Not made
3	No spinal fluid examination made.						
4–	6	Increased	++	18	N	0	0001231000
5–	15	"	trace	15	N	0	2334300000
6–	18	N	0	9	N	0	0000000000
7–	28	Increased	++	12	N	0	1212100000
8–	30	"	trace	3	N	0	Not made
9–	3	"	++	38	N	0	0111221200
10–	6	"	trace	8	N	0	0110000000
11–	12	"	++	54	N	0	0122210000
12–	10	N	0	6	N	0	Not made

Our present series of Lethargic Encephalitis comprises twelve cases, ten of which occurred in Minnesota during the last four months and the other two I had an opportunity to observe while with Base Hospital Number 99 in France.

The first case is of interest because of the very mild course, the typical Parkinson gait and the possibility of a brain abscess.

Case No. 4. Female; age 28, seen in consultation with Dr. J. Staley October 20th, 1919. Her family and personal history were negative except that she had scarlet fever as a youngster complicated by a right chronic otitis media. Passed through a mild attack of Influenza in De-

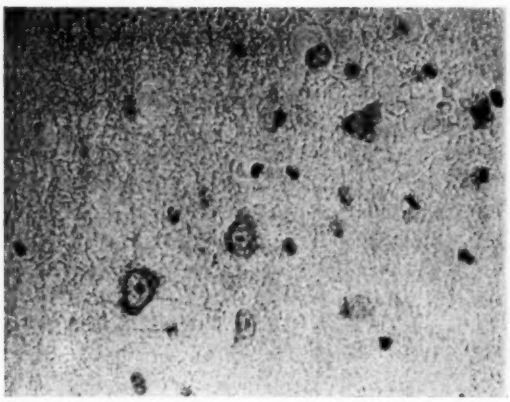

Fig. 1. In the region of the 3rd nucleus, showing chromatolysis.

cember, 1918. About October 1st, 1919, patient noticed that her discharging ear "had stopped running" and was somewhat tender. Two weeks later she complained of vertigo and drowsiness. Soon after, she developed diplopea and a choking sensation on swallowing. She went to bed and slept continuously for three days. She "felt stiff and rigid" all over and had an expressionless face. On October 16th, her ear began to discharge again and she noticed an improvement. Examination was made October 20th, 1919. Patient was lying on the couch, but had ben up and around part of the time. She had a typical paralysis agitans gait and posture without the tremor. Her right pupil was slightly larger than the left. They both were sluggish to light and accommodation; the backgrounds were negative. Her face was mask-like, but she could move her facial muscles. Her eye movements were normal except that there was a slight constant irregular nystagmus-like movement of both eyeballs. She protruded her tongue with difficulty. Her upper extremities were negative except for a mild rigidity. Her lower extremities were rigid, had absent knee-jerks, the Achilles jerks were present; there was a bilateral ankle-clonus, but no Babinski. Superficial reflexes were normal; her bladder functions were normal; there was no Romberg, no Kernig and no rigid neck; the temperature and pulse were normal throughout. Spinal fluid examination on October 20th showed the following: Increased pressure, a trace of globulin, 16 lymphocytes per cu. mm., a negative Wasserman and a negative Colloidal Gold curve; the urine was negative. Patient improved decidedly after lumbar puncture and in three weeks had entirely recovered.

The second case was of unusual severity and manifested spinal cord involvement.

Case No. 8. Male: Age 24; seen in consultation with Dr. Brimhall October 22nd, 1919. Family and personal history negative except that patient had a mild attack of Influenza in January, 1919. Present trouble commenced September 16th, 1919, with severe frontal headache lasting about ten days, after which patient went to bed. This headache was entirely relieved by the use of an ice-bag. On September 28th, he became stuporous and gradually developed general muscular rigidity. He could be aroused without much difficulty and would answer questions coherently. Since October 29th, he has been unable to talk, but understands, everything fully. It has been necessary to catheterize him regularly. At times he has had irregular coarse twitchings of his right arm and leg. During the past three weeks he developed an atrophy of the adductor pollicis brevis and the interossei muscles of the right hand. From September 26th to October 25th, his temperature varied between 100 and 103°F., and his pulse was around 130. Since then his temperature has gradually dropped to 99.6 and his pulse around 94. The neurological examination on October 22nd, 1919, showed the following: Patient in bed with eyes closed and motionless. Can be roused without difficulty; neck rigid and general muscle rigidity. The face is mask-like but he can move all facial muscles on command. The left eye was miotic and smaller than the right. They both respond sluggishly to light and accommodation. All eye muscle movements are normal; backgrounds negative. He protrudes his tongue to the lips after considerable urging. At times there is a slight tremor of the right side. The upper extremities were negative except for a mild general rigidity. The lower extremities showed increased bilatral knee-jerks, no ankle jerks, no Babinski, general rigidity. The laboratory examination made on October 24th showed the following: leucocytosis 14,000; blood Widal and Wassermann negative; blood culture negative; urine normal; blood pressure systolic 120; diastolic 75. Spinal fluid was under pressure, gave a mildly positive

globulin, three lymphocytes per cu. mm., a negative Wassermann, no Colloidal Gold was reported. Laboratory examination made on November 5th gave similar findings. I saw this patient again on November 21st. His picture had not changed materially except that he seemed brighter and his temperature was lower. However, he had developed some atrophy of the right hand muscles. On Jan. 18, 1920, Dr. Brimhall informed me that patient had improved, so that he was able to play cards.

Case No. 9 is a typical case with the usual symptom complex. Male: Age 21, seen in consultation with Dr. Hammes, Sr., at Hampton, Minn., November 12th, 1919. Negative family and personal history except that four members of the family had a severe attack of Influenza in February, 1919 the present patient, however, escaped. On November 6th, 1919, patient complained of severe frontal headaches and general malaise, temperature 102°F., pulse 85. He recovered entirely by November 10th, but the following day he became drowsy and stuporous, which gradually increased. The patient would lie in bed, motionless like a log, with eyes closed and mask-like face, but could be aroused easily and answer questions. Neurological examination showed the following: Left pupil larger than right; they both respond sluggishly to light and accommodation and were moderately miotic; backgrounds of eyes negative. The eye movements were normal, features were expressionless, but facial muscles could be moved normally. The tongue was protruded with difficulty and only to the lips. He moved both upper extremities in an awkward manner and they were mildly rigid. The lower extremities were similarly affected the knee-jerks were diminished, Achilles jerks normal. There was a slightly rigid neck but no Kernig. Superficial reflexes and sensation were normal. There was urinary retention and the patient had to be catheterized. Temperature 101°F., pulse 114. Spinal fluid was under pressure, gave a positive globulin, 38 lymphocytes per cu. mm., a negative Wassermann, and a Coloidal gold curve 0111221200. No blood examination was made. Urine negative; blood pressure systolic 118; diastolic 70. The patient is gradually improving. On November 27th, he had two general convulsions of short duration followed by a paralysis of his right arm. This, however, cleared up in about eight hours.

Case No. 10. Female; Age 51; seen in-consultation with Dr. Sanford of Farmington, November 6th, 1919. Family and personal history were negative. Patient states that during the week of October 20th, 1919, she nursed her daughter, who was supposedly suffering from Influenza. October 30th, patient developed an acute coryza, with general malaise, dizziness and severe headaches. The following day her vision became blurred and the next morning she complained of diplopia and severe pain in the left ear, which subsided in 24 hours. On November 4th, she became stuporous, but could be aroused easily and answered questions promptly, but would move her extremities awkwardly and only when urged. Otherwise, she would lie in bed with eyes closed and motionless. On November 5th, she developed irregular twitchings at the right angle of the mouth and occasionally of the right hand. Her left arm seemed ataxic and she began to have involuntary urination. Her temperature varied betwen 99 and 102 and her pulse around 100; physical examination was negative. Neurological examination showed the following: Pupils were somewhat miotic, but responded to light and accommodation; the fundi were normal; there was weakness of the right sixth and also of the right facial muscles; the face was expressionless; there was a general rigidity of all extremities; she moved her left arm in a jerky manner. All deep and superficial reflexes were normal. Tactile and pain sense were impaired over the right hand and forearm. Spinal fluid examination on November 6th showed an increased pressure, a trace of globulin, 7 lymphocytes per cu. mm., a negative Wassermann, and a negative Colloidal Gold curve her urine was negative; systolic blood pressure 140; diastolic 70. Patient progressively grew worse and died November 8th, 1919.

Case No. 5. Male; age 53; admitted October 16th, 1919, to the Neurological Service, City and County Hospital, St. Paul, gave a negative family and personal history. On October 12th, 1919, patient complained of an acute coryza, severe headache, general malaise and joint pains. He began to wander around his home in an aimless manner. The following day he became drowsy and sluggish mentally and soon after

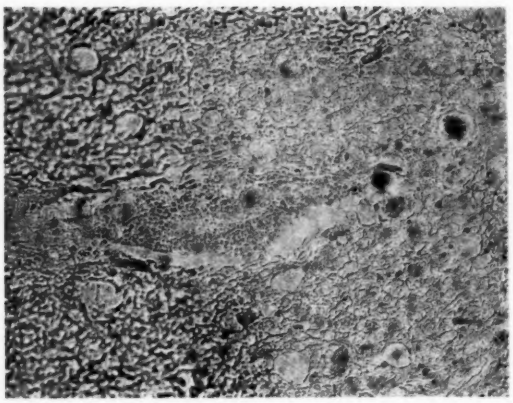

Fig. 2. Pons, showing marked round cell infiltration and edema.

became stuporous. When I first saw him six days after the onset, he was disoriented, but answered all other questions intelligently. He was lethargic but could be aroused readily. The neurological examination showed the following: Pupils were moderately dilated and did not respond to light or accommodation. There was a weakness of the right external and left internal rectus eye muscles. The fundi were negative. The face was mask-like, but he could move all facial muscles. He protruded the tongue with difficulty. The upper extremities were normal, but mildly rigid. The lower extremities showed absent knee and Achilles jerks, no Babinski, no spasticity. Leucocytosis 11850, blood culture negative, urine normal except for trace of albumin. Blood Wassermann negative. Spinal fluid gave increased pressure, a trace of globulin, 8 lymphocytes per cu. mm., a negative Wassermann and a Colloidal gold curve 2334300000. Repeated lumbar punctures gave similar spinal fluid findings. The patient progressively grew worse and died eighteen days after onset of illness. The post-mortem performed by Dr. Kramer, revealed no pathologic changes except a thickened urinary bladder wall and a chronic diffuse nephritis. Gross examination of the brain showed that its surface was slightly congested, the lateral ventricles were moderately dilated; cross-sections throughout appeared normal. There was no gross evidence of hemorrhage or softening. Microscopic findings will be reported later.

Case 6 is of interest because of the involvement of the respiratory centres early in the disease. Male: Age 45; was admitted on the Neurological service, City and County Hospital, St. Paul, October 29th, 1919. His family and personal history were negative. On October 15th, patient noticed that he felt weak, drowsy and wanted to close his eyes. He continued his work as a teamster for three days, until he went to sleep while driving his truck fell down and injured his knee. He remained at home for eleven days during which he "slept" most of the time. He also noticed difficulty in breathing at times. Patient was examined October 20th; he was in bed motionless and with eyes closed. He could be aroused easily, answered questions, got up and walked around, and presented the typical gait and posture of a paralysis agitans. Occasionally, he would have a general coarse tremor. At irregular intervals, he would get attacks of cogwheel respiration of one to two minutes' duration, during which his respiration would go up to 72 per minute. He was markedly rigid. Physical examination was negative except for an atrophy of the left calf muscles, which patient states he has had all his life. His pupils were normal. The light and accommodation reflex was sluggish and disappeared after three days. There was a paralysis of the right internal rectus. The face was mask-like, but all movements were normal. All other cranial nerves were normal. All deep reflexes were normal except for an absence of the left Achilles jerk. Blood culture was negative, Widal negative, Wassermann negative; leucocytes 12,200. Spinal fluid was under pressure; contained 10 lymphocytes per cu. mm., and a trace of globulin, but was normal otherwise. His temperature varied between 100 and 102, his pulse around 130, his respiration varied betwen normal and 72. His stupor gradually depened and he died November 9th, 1919. Postmortem examination performed by Dr. Kramer gave no gross pathologic findings. The meninges were moderately congested as was also the entire surface of the brain. Cross sections revealed no lesions. The meninges covering the spinal cord were normal, as was also the cord itself. Microscopic findings will be described later.

Case No. 11; male, age 23, was admitted on Dr. A. Hoff's medical service, City and County Hospital, St. Paul, November 16, 1919, with a

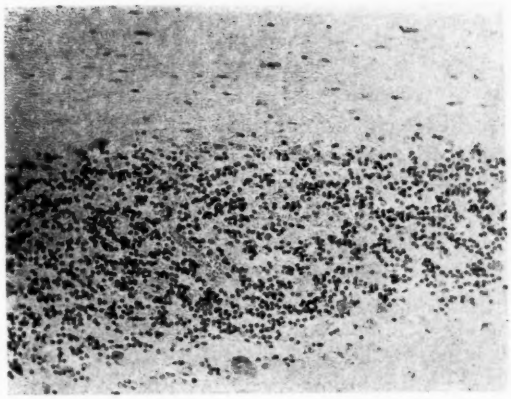

Fig. 3. Cerebellum showing capillary congestion.

diagnosis of suspected typhoid. A lethargic encephalitis was suggested and Dr. Hoff kindly permitted me to see the patient. His family and personal history were negative. About November 9th, he began to feel drowsy and weak. Soon after he had two severe attacks of epistaxis. About November 12th, he developed marked photophobia, also a slight general muscle rigidity, and he became stuporous. I first saw the patient on November 18th; he was drowsy but could readily be aroused and answered questions coherently. His mental condition was normal. He would not open his eyes because of marked photophobia. Neurological examination showed the following: Pupils equal and responded to light and accommodation. He had a paresis of the left internal rectus. All other cranial nerves were normal. All deep reflexes were normal. He had a positive right Babinski. Blood culture was negative, Widal negative,, Wassermann negative; leucocytosis 17000, urine normal. Spinal fluid was normal except for a positive globulin and 54 lymphocytes per cu. mm. On November 19th, he seemed confused and disoriented and developed a typical mental picture of a Korsakoff's psychosis. He died November 21st, 1919. Postmortem was performed by Dr. Kramer and gave no general gross pathologic findings. The meninges and the brain surface were markedly congested and edematous; the blood vessels were engorged but there was no evidence of hemorrhage. Cross sections revealed a generalized congestion without any evidence of hemorrhage. A small area of softening was found in the region of the medulla. The histopathologic findings will be reported later.

While with Base Hospital 99 in France, I saw two soldiers, both of whom gave a history of an acute attack of influenza with recovery. Several weeks later, they complained of headache, double vision and gradually became stuporous. One had a slight tremor at times, spasticity of the extremities and involuntary urination and was confused mentally. Temperature varied between 100 and 102°F. The stupor became more marked and the patient died after a four weeks' illness. His spinal fluid was negative except for a positive globulin test and 27 lymphocytes per cu. mm. The other case ran a milder course, his diplopia and lethargy gradually improved, but his general muscle rigidity and expressionless face were still present, although slight, after seven weeks, when he was transferred to another hospital. His spinal fluid was normal throughout.

Preliminary report of the histopathologic findings. The histopathologic lesions in our cases were similar to those described by others in Lethargic Encephalitis. We had an opportunity to study the brains in Cases Nos. 5 and 11 and the brain and spinal cord of Case No. 6. Although the findings in the main were very similar, the most marked changes were observed in Case No. 11.

The outstanding features were:

(a) Perivascular infiltration of polymorphenuclears and lymphocytes, the latter predominating.

(b) Pericellular gliosis.

(c) Chromatolysis and neurophagia in the brain and spinal cord especially in the mid-brain and brain stem.

(d) Dilatation of the perivascular and pericellular lymph spaces.

(e) Congestion of the capillaries and smaller vessels in the cerebellum and other areas.

(f) Marked pigmentation of the anterior horn cells and some of the cells of the cranial nuclei.

(g) In Case 5 and 6, the meninges were practically normal, while in Case 11 there was definite evidence of an acute inflammatory involvement of the meninges, especially in the region of the cerebellum and the pons.

I am indebted to Dr. C. E. Nixon and Dr. J.

McKinley for their kind assistance in the study of the microscopic sections.

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THE TREATMENT OF EMPYEMA BY A CLOSED METHOD*

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Surgery of diseases of the thorax is still in a chaotic state. One has but to mention injuries to the lung and heart, malignant tumors, abscess of the lung, and bronchiectasis to recall the inefficiency of surgical treatment. The thorax has long been a "no man's land" except to the most courageous. Almost up until the present time, the lung has been the sole organ that has not been subjected to the ordinary rules of war surgery, but Duval[1] has recently stated that now, surgery of the lung is a revolution; that it is not the redoubtable organ that it was before the war, for it has been proven practical to eventrate the lung, lobe by lobe, just as one does loops of intestine—to incise, resect and replace in the thorax. The physiology of respiration, as modified by war wounds, is again being investigated and debated, the mechanism of lung collapse and the regulation of negative pressure are again new problems.

Conspicuously ineffective has been the treatment of empyema,—the most common of the surgical effections of the chest—admittedly badly handled, with its high mortality, its prolonged period of disability, and its secondary operations so frequently deforming.

In a very complete report from Mount Sinai hospital, covering a period of 10 years, Wilensky[2] gives an average mortality of 28%. In many of the army camps the mortality was from 45 to 65% while one camp reported the excessive death rate of 84%; the average for all the camps for empyema preceding the influenza epidemic was reported by the Influenza Commission[3] as 30.2%. From 10 to 25% of the patients that recover have more or less trouble with their wounds, necessitating some form of secondary operation, either a simple thorocotomy or one of the deforming operations of the Schede, Estlander or Delorme type. Mount Sinai statistics show an average stay in hospital of 44 days; Perthes Sims and Gros show an average stay in hospital of 94 days, and to these periods of illness must be added, further, long periods of convalesence before health is restored. To quote from one army camp: "Convalesence is more than 3 months in duration in all cases, and not one soldier has been found with full restoration to health; it is doubtful if any of these soldiers will become fit for full duty within six months after operation, and the majority, undoubtedly never will." Obviously, here is opportunity for betterment in the handling of empyema.

During the spring epidemic of measles and streptococcus pneumonia and the fall epidemic of influenza pneumonia, at Camp Dodge, there were 177 empyemata that were treated by the surgical service of the base hospital.

Our experience led us to make several radical changes in the management of this disease and this experience is offered as the basis for this paper. In the first place, the older and ccommonly accepted practice of operative interference immediately following the discovery of pus in the chest when secondary to lobar pneumonia, was found inapplicable to the empyemata of streptococcus pneumonia that prevailed in the epidemics mentioned. This change of treatment followed the development of our knowledge of the new type of pneumonia and was based upon the nature of the differences of the two conditions. In the empyema of lobar pneumonia as we were accustomed to it in civil practice, we were dealing with a post-pneumonic complication—a condition that arose after the acute illness had somewhat subsided, while in the empyema of

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the streptococcus type we were dealing with a complication which was characteristically coincident with the pneumonic process. It was no uncommon occurrence for a soldier to be admitted to the hospital for pneumonia who had at the time of admittance a massive pleural exudate. Ward surgeons were instructed to be on the lookout for fluid in the chest in every newly admitted pneumonic patient.

Early rib resection was at first routinely practiced but was attended with such disastrous results that it was soon abandoned, aspiration done and repeated as many times as necessary until the patient passed the critical period of his pneumonia and the fluid was more definitely purulant. When early rib resection was employed the patients frequently returned to their ward in shock from which they never rallied. The mortality of early rib resection in 65 cases, was 54%; when repeated aspirations with later thorocotomy, was adopted the mortality fell to 32%. Repeated aspiration with deferred thorocotomy, represented the accepted treatment at the close of the spring epidemic.

With the onset of the influenza epidemic in October, which was characterized by an intense virulence and excessive mortality, only the most conservative surgical methods were practised and an early effort made to establish the principals of a treatment for empyema that would be appropriate to the conditions. It was decided first, to try to tide the patient, seriously ill with pneumonia and empyema, over the critical period of his illness by one or more aspirations, thereby preserving for him all of his remaining respiratory function, by avoiding a pneumothorax and collapse of the lungs, thereby also avoiding the shock of an operation for drainage when he was least able to stand it; and secondly to try and maintain a constant negative pressure in the thorax in order to secure expansion of the lungs and rapid obliteration of the abscess cavity. Approximately 43 of the earliest cases, were treated by repeated aspiration and the injection of 2% formalin-glycerin. Though of distinct value, aspiration proved at best, a temporary expedient in tiding a patient over to a time of increased resistance. Not one case recovered by means of aspiration alone. Some more adequate drainage was necessary.

We then adapted with some modifications, a method which had been tried at Camp Lewis[4] of a simple inter-rib thorocotomy, under local anesthesia, with the insertion of a special tube through the chest wall, which was then sutured tightly to the tube in order to make the pleural cavity air tight. The special tube consisted of a $\frac{5}{8}$ inch rubber tube connected with a bottle to receive the drainage, and through this larger tube ran a Carrel tube to a flask of Dakin's fluid. Constant negative pressure was attempted by connecting the drainage bottle with two other bottles serving by syphon action, to exhaust the air in the drainage bottle.

The practical application of this method soon demonstrated its inefficiency, for the tube in the chest wall would become loose, air would thereupon enter the pleural cavity and collapse of the lung follow. Drainage from the chest would occur along the tube and the danger of secondary infection result. Twenty-nine cases were thus treated,—four of which recovered and nineteen had the large tube removed and were treated by the method next to be described.

About the first week of November, we received from Lt. Col. Jos. Miller, then in the Surgeon General's office, but formerly chief of the medical service at Camp Dodge, a report of a board appointed to report to the Surgeon General, upon the merit of a closed method of treating empyema which had been developed by Capt. A. E. Mozingo, M. C. U. S. Army, at the Walter Reed Hospital. The opinion of this board was "that the results of this treatment are sufficiently striking to warrant its more extended use."

The essential points of this method[5] are;

(a) A single early minor operation, without danger of shock or of collapse of the lung.

(b) The intermittent removal of pus, and antiseptic treatment applied through a small rubber tube which fits air tight in the chest wall.

(c) Rapid partial sterilization with Dakin's solution followed by complete sterilization with 2% formalin-glycerin.

(d) Maintenance of negative pressure in the empyemic cavity tending to early obliteration of the cavity.

(e) One dressing which will last several days with no skin irritation.

Our technique[6] carrying out the above essential points was as follows: Under novocain, a 7 m.m. trocar with cannula, was introduced into the pleural cavity, a small incision in the skin having been made previously over the cavity as determined by preliminary aspiration. The trocar was withdrawn, leaving the cannula in place until a 24 F. catheter, with one terminal and two lateral openings had been introduced. Then with a 30 c.c. Luer syringe the pus was withdrawn; care being taken to avoid the entrance of air by clamping the tube when the syringe was disconnected from the tube. After the pus had been withdrawn in this manner, 20 to 50 c.c. of Dakin's solution was injected into the cavity and sucked in and out to dissolve the fibrinous masses. The cavity was then nearly filled with Dakin's solution and this allowed to remain from 10 to 30 minutes and then withdrawn. The treatment was repeated from 4 to 6 times in the 24 hours, the frequency depending upon the condition of the patient and the rapidity with which the pus accumulated. The tube remained clamped except when aspirating or injecting. All cases were controlled by laboratory count and when the discharge on smear, was free from micro organisms, which was usually from 10 to 14 days, the treatment period was extended to 12 hours, and then after each irrigation 10 to 50 c.c. of 2% formalin-glycerin was injected and left until the next treatment, when the process was repeated. When the discharge became sterile to culture and the cavity had diminished to a capacity of 15 or 20 c.c. the tube was withdrawn and the opening allowed to heal.

Beside roentgen-ray pictures were repeatedly and systematically taken of all cases, and they proved that negative pressure was maintained and that lung expansion did persist in the cases treated by the closed method; a rapid diminution in the size of the cavity in the cases which had a pneumothorax at the beginning of this treatment was also demonstrated.

Of the 43 cases treated by this method, all were cured of their empyema and none of them had to have secondary operations, save one case which, significantly happened to be the first empyema operated, and upon which an open thorocotomy had been done with no attempt made to prevent collapse of the lungs. This case was openly drained for several weeks before the closed method was tried. The cavity was successfully sterilized and closed and the patient left the hospital for her home but was reported to have had a secondary abscess opened in a posterior position.

The average time between the operation and the closing of the wound was 31 days; the shortest time being 16 days. It should be remembered, however, that 37 of our series had been repeatedly aspirated or subjected to some form of thorocotomy previous to the employment of the closed method and it is not to be expected that our results would be as good as in a series in which the closed method had been used exclusively and instituted early before the stage of thickened pus. Our mortality was 4%. In a personal communication dated September 19, 1919, Captain Mozingo writes that he has treated 129 cases by this method, at the Walter Reed and Camp Pike hospitals and that in no instance has it been necessary to reoperate for recurrence; that but two deaths occured in the series, both resulting from double empyema, one acute and one chronic. In the first 70 cases the cavities became sterile in an average of 10 days. There were no chest deformities and full chest expansion was obtained.

This simple closed thorocotomy has definite and distinct advantages and can be used with a wider range of cases, with the assurance of safety which is not promised by open thorocotomy.

The preservation of the negative pressure in the chest through treatment assures against primary collapse of the lungs and its consequent dangers.

Recently, Graham and Bell[7] have re-emphasized the dangers of primary pneumothorax occuring during pneumonia. From an experimental and clinical study, they show that from the standpoint of pressure relationship the normal thorax should be regarded as one cavity instead of two. Any change of pressure in one pleural cavity is accompanied by practically an equal change in the other so that an equilibrium of pressure exists at all times through the whole thorax. The prevalent conception of

pneumothorax is, therefore, erroneous, in that it is based upon the assumption that when an opening is made into the chest, one lung is collapsed and that the other lung maintains respiration. This assumption implies that the mediastinum constitutes a rigid partition between the two cavities, which is not the case. Much depends upon the size of the opening in chest. Whenever the amount of air taken into the lungs is limited by the presence of an active pneumonia or when there is sufficient weakening of the respiratory muscles to impair compensation, the size of the pleural opening compatible with life becomes correspondingly smaller. Therefore they insist, early operation in streptococcus pneumonia with open pneumothorax carries an unwarranted danger.

In our cases there was a noticeable difference in the aspect of the patient when operated by this simple method. The absence of pain, of shock, of dyspnoea and of respiratory embarrassment was in striking contrast to these complications attending open thorocotomy, the respirations in the latter cases sometimes going to 50 or 70 and the patient presenting the picture of acute air hunger. The closed method, also, affords a distinct advantage over open thorocotomy, by reason of the mechanical obliteration of the empyemic cavity due to constant expansion of the lung. This favors early beneficial adhesions between the pleurae and secondary pockets are thus prevented. The cause for retardation of healing of empyemata or for the failure to heal, in 50%, at least, of cases is due to an uncollapsable cavity; the rigid chest wall and the lung bound in collapse, constituting the mechanical explanation. Rapid sterilization and lung expansion combat these hindrances effectively. The closed method, moreover, insures against secondary infection which, it is well known, contributes largely to the chronicity of empyema.

Throughout treatment by the closed method, the tube remains tightly hugged by the chest wall, so effectively, that there is no soiling of dressings and the original simple dressing frequently remains on for 2 or 3 weeks. Other points of merit are: The absence of pain and tenderness which is so frequently complained of by patients with rib resection; the absence of scars; the attainment of full chest expansion. Patients under this treatment may be up and around in a few days after operation and seem to convalesce the faster for it. The simplicity of the technique, the minor character of the operation, the cleanliness and comfort of the patient, and the economy of time and dressings further recommend it as the ideal treatment for acute empyema yet devised.

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A NEW OPERATION FOR PYOTHORAX: THE TREPHINE OPERATION*

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Empyema is a grave condition. The common pneumococcic variety has generally made primary recoveries following nearly any type of thoracotomy. These primary recoveries have been followed, however, in large percentages, by the secondary evil results of chronic suppurating cavities and sinuses demanding surgery of an heroic calibre. It is from these latter secondary conditions that the true mortality and morbidity rates must be calculated. Many of these cases "with just a discharging sinus" **and a cavity behind it,** after repeated operative efforts, or without the same, finally become worn out and die.

Empyema of streptococcic origin has always been attended by a certain primary mortality. The empyemata of our recent epidemic have had a shocking primary mortality both in civil and military practice. Undoubtedly this mortality was due in great degree to the large percentage of streptococcic infections and to the character of the antecedent or ecomplicating primary illness. However, certain fundamentals of the

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physiology of respiration and the pathology of the disease have been disregarded, which directly affected the morbidity and mortality.

The thoracic cavity is in a constant state of varying negative pressure. When the normal pleural sac is incised and left open, air enters from without, the lung in time collapses, and positive atmospheric pressure obtains, forcing the mediastinum over to the opposite side, thereby embarrassing both the respiration and the circulation. An acute open pneumothorax is a serious and major lesion, having a direct mortality even in the absence of infection, as has been attested in the recent war.

The same mechanical conditions obtain when an open thoracotomy is performed during the formative period of a streptococcic pyothorax, that is, before adhesions have formed between the pulmonary and parietal pleura, fastening the lung to the thoracic wall and so preventing its collapse and retraction. In many of these cases the shock of the hyperacute pneumothorax, with the lung collapse and the displaced, fluttering mediastinum, resulted in an early and prompt death of the patient. The arduous and painful, repeated, aspiration was advocated to avoid the dreaded evil consequences of the pneumothorax. Pneumothorax is particularly hazardous in the presence of an unresolved pneumonia on the opposite side.

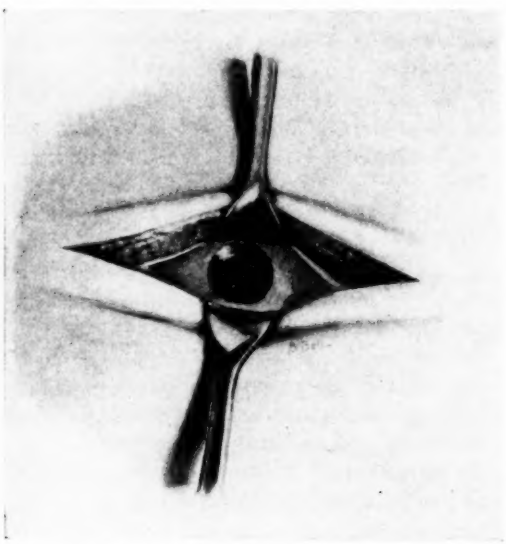


Fig. 1. The exposed rib with the periosteum over its anterior surface separated, has been trephined. The posterior periosteum and pleura at the bottom of the trephined opening are intact.

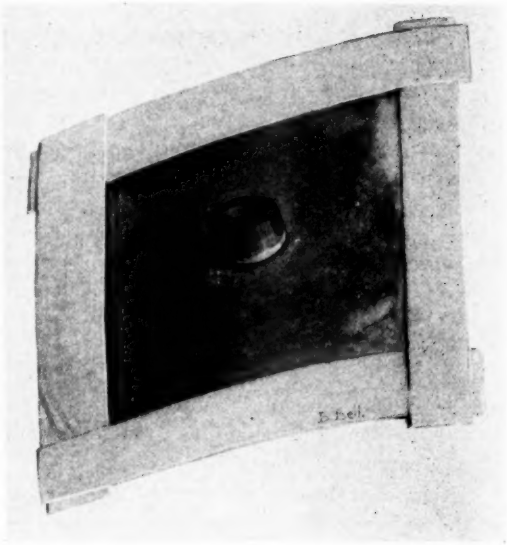


Fig. 2. The rubber drainage tube passing through the trephined opening into the empyemic cavity is shown emerging through the perforated square of rubber dam which is strapped to the chest wall with adhesive tape.

If the patient survives the immediate effect of the acute pneumothorax, the collapsed, retracted lung rapidly becomes adherent in its new location, usually high up in the thorax and close to the vertebral column. The visceral and parietal pleura becomes thickened and an enormous chronic suppurating cavity is formed, requiring multiple operations before a closure is effected. Not infrequently, surgery proves ineffectual.

Open thoracotomy in the walled off empyemata usually causes a certain degree of partial lung collapse in addition to the compression already present. As we well know, nature, surgery, or both, are frequently slow in obliterating the cavities so formed.

The primary operation for pyothorax should endeavor to provide for: 1. Adequate drainage; 2. Appropriate medication by irrigation; 3. Prevent the ingress of air and the attendant pneumothorax and cavity formation; 4. Provide negative pressure suction to thoroughly remove the discharges and to aid in expanding the lung.

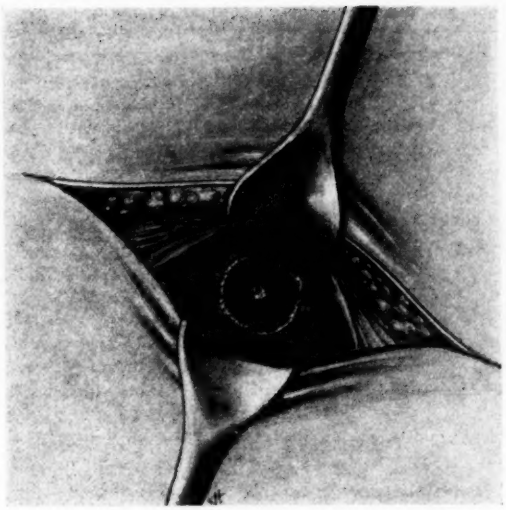


Fig. 3. When a narrow rib is encountered it is advisable to remove the button from the upper portion of the rib.

The following operation consisting of the trephining of a rib was first performed at the University Hospital six years ago. It affords an air-tight joint for the application of the continuous, even, negative pressure suction pump with provision for the Carrel-Dakin irrigation. The operation may be, and usually has been, performed under local anesthesia.

A short incision is made over and parallel to the rib at the site selected for drainage. This incision should not be made with the arm hyper-abducted, as the skin wound then will not overlie the rib without strain when the arm is brought down to the natural position of rest in bed. The periosteum of the rib is incised and separated only over the external surface. A button of bone is removed from the rib by a small crown trephine. When a small, narrow rib is encountered, it is advisable to remove the button from the upper portion of the rib, as shown in Illustration 3, otherwise fracture of the rib may obtain. The posterior periosteum and pleura is incised by a crucial incision through the bone hole, and a stiff, very snug fitting, rubber drainage tube, the same size as the trephine, is inserted, and forced into the drainage opening, forming an air-tight joint. The tube just enters the pleural cavity, must not impinge upon the lung and is hugged by the natural elasticity of the periosteum and pleura. This joint is further reinforced by bringing the drainage tube through a small perforation in the center of a square of dental rubber dam, which is fastened to the surface of the skin by adhesive tape covering the edges, as shown in Illustration 2. The position of the tube may be protected by placing a few turns of adhesive tape about it as it emerges from the rubber dam square, and fastening the same to the chest wall.

The negative pressure and irrigation apparatus, as illustrated in Figure 4, is now attached to the drainage tube. All of the drainage is collected in the first bottle. Any degree of negative pressure desired can be obtained and is

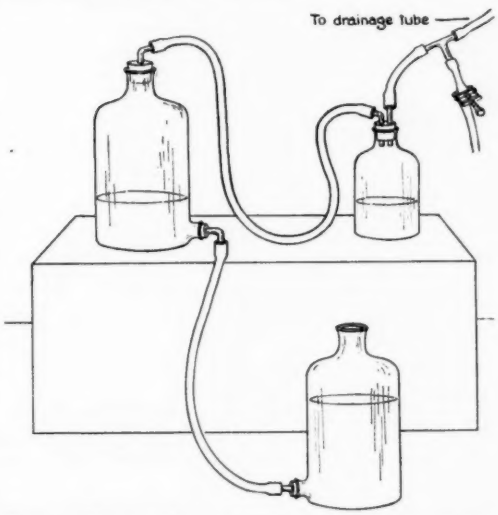


Fig. 4. The negatice pressure and irrigation apparatus. The drainage is collected in the first bottle. Any degree of negative pressure desired can be obtained by adjustment of the vertical distance between the water levels in the two large bottles.

measured directly by the vertical distance between the water levels in the two large bottles. There is some advantage in having a mercury manometer attached, for occasionally the negative pressure is deceptive if a column of air should occupy a section of the tube connecting the bottles. When the water in the upper bottle has drained away, it is necessary only to change the stopper and reverse the position of the bottles. When all connections are good, the apparatus needs no adjustment and functions perfectly for days at a time.

The operation has the following advantages:

1. Trephining a rib is much more simple than resection of the same.

2. Multilation, deformity, and spur formation with fixation to the adjoining ribs, is avoided.

3. Continuous, even negative pressure may be maintained, preventing pneumothorax and its attendant evils.

4. The negative pressure aids in the expansion of compressed lungs and cavity obliteration.

5. The function of all non-consolidated lung is conserved.

6. All discharges are collected in the receiving bottle, obviating the necessity of repeated dressings. This means much to the patient's comfort and cleanliness.

7. The suction prevents the accumulation and retention of pus in the pleural sac, and the absorption of the contained toxins.

8. The likelihood of introducing secondary infections is less than in open drainage.

9. Provision is made for the anti-germicidal and solvent action of the Carrel-Dakin irrigations.

10. When the infection has subsided and the pleural sac sterilized, a functionating lung capable of filling the thoracic cavity has been preserved.

DISCUSSION ON PAPERS OF DRS. STRACHAUER AND MANSON.

DR. ARTHUR T. MANN, Minneapolis: Unfortunately I did not hear the first paper and really have no right to discuss it. But I can hardly see how a trephine of the rib is better than a resection with the periosteum left in place. The periosteum produces new bone and we get quicker healing when we want to than we would where the periosteum is destroyed, as it would be by trephine opening.

I am very much interested in the paper of Dr. Manson. I was at the Base Hospital at Camp Dodge when these empyema cases started and Dr. Manson was taking care of them. I was in charge of the Surgical Service, and Dr. Manson afterward succeeded me when I left. He has done most of the work in regard to those cases.

We have an entirely different situation with the empyemas following the influenza than we had from the ordinary empyemas following the diplococcus of pneumonia. In the first place, our pneumonia and the empyemas in the ordinary diplococcus pneumonia did not start until the crest of the pneumonia was passing or had passed. The lung was getting better, so that what we had in the nature of an empyema we had in the presence of a recovering lung. With these cases of streptococcus empyema and the mixed streptococcus and the other germ empyemas which came with the influenza pneumonia, we had pneumonia in spots, a new kind of pneumonia in spots through the lung which is increasing and the empyema has come. The lung is getting worse; the patient is loaded with toxins; he is not recovering from his pneumonia; he has not had a crisis, with the temperature lowering and then beginning to go up with the empyema.

An operation which might be done with the empyemas after the ordinary pneumonia is wrong, particularly with the empyemas which come with the influenza, because we have a patient who is very ill, who has little resistance, and a pneumothorax at that time, with a lung which is laboring under all that it can carry, and a body which is under strong toxic conditions may often lead to a collapse on the operating table, and occasionally a death on the operating table, or with marked shock from which sometimes the patient never recovers when he gets back to the ward.

Coming to the Mezingo method, the doctor has brought out the points very clearly. If an empyema in a sick man is tapped and the fluid withdrawn, the lung has a chance to expand. That is one of the strong factors in favor of the method. Then, if by the injection of Dakin's fluid and withdrawal until it comes clear, we can more or less sterilize that cavity, we have added another factor which we have not been able to use before. Sterilization of the cavity, rapid expansion of the lung and the continued well being of the patient are the three points there. Just as an illustration, I had one man with streptococcus empyema and pneumonia of the mixed type. Under local anesthesia we withdrew a pint and a half, 750 c.c. of fluid without any trouble to the patient. A culture on the third day showed only two clumps of bacteria. The culture was not taken until the sixth day and it was sterile, or sometime between the third and sixth day it was sterile and stayed so. The tube was removed and healing was almost by first intention after the tube was taken away.

DR. O. C. STRICKLER, New Ulm: Although we all readily admit that there have been very great advances made recently in the treatment of empyema, still I predict that the last word has not been said in this direction.

We must remember that the epidemic through which we have passed was an unusually severe one.

The intense pulmonary congestion present in so many cases and the rapidly accumulating pleural effusion were not only prominent factors in considering the mortality rate, but also materially assisted in rendering an exact pathological diagnosis unusually difficult. This fact was brought out in a publication issued by Dr. Manson wherein he stated that some cases showed an accumulation of pleural fluid in twenty-four hours of from 1500 to 2000 c.c.

This condition muffled very markedly the chest signs and symptoms, as we have heretofore been unacquainted with such a rapid pleural accumulation in any form of chest infection. Some cases were aspirated too early, and as no fluid was found the procedure was not repeated, when had aspiration been performed later immense deposits would have been found.

If, as is so positively predicted, we are to experience the coming winter another epidemic, we must again use our aspirators whenever conditions point to this complication. Should fluid be found, we should evacuate the same only in line with the latest and most modern technic. I am, however, of the opinion that thoracotomy will still have its place in those cases where after the crisis has passed, immense masses of fibrin are retained, as I doubt if we can expect that either the Carrel-Dakin solution or any other preparation can disinfect such a deposit.

DR. H. R. WEIRICK, Hibbing: I have been very much interested in these two papers, and I gather from Dr. Manson's experience that he was dealing with acute cases mainly.

There is one feature regarding the method which he described which is very clearly illustrated by a post-mortem examination on a chronic case. If you will take an old chronic case of empyema and post it, you will find in the chest there are numerous trabeculae and signs in which the pus collapses. This condition is not due to an active condition of the organism that has caused the abscess particularly, but due to the negative pressure of which the doctor spoke; consequently if you take an old chronic case of empyema that has been opened wide and allow plenty of outside pressure to come in, these trabeculae lengthen, the sacs increase, and of course the quantity of pus increases with the surface that is exposed to pus formation.

The doctor's method of applying vacuum or making firm pressure is nearly as possible the correct idea.

Dr. Strachauer's idea of trephining a rib, it seems to me, would aid in a measure. But if you take a rib and trephine it, then put in a rubber tube on top of it, you do not have much more of an opening for drainage than if you used a good strong trocar between the ribs, and you might as well use the space between the ribs as to mutilate a rib. Moreover, I think the patient will recover just as fast when a rib is out as he would with the other process. I am guessing at this, but I think if you put a soft rubber tube in a trephine opening in the rib in a short time the formation of new bone would close in on the rubber tube so that drainage would be practically nil.

DR. ARTHUR N. COLLINS, Duluth: I have no quarrel with the essayists on the question of trephining or on thoracotomy. I want to touch briefly on the relative pathology with which we come in contact as we attempt to cure all these empyema cases from the early infection to the state of chronicity.

In the first place, we have a thin, yellow, fairly clear fluid, and that gradually progresses to a thicker fluid. In either of these stages it is easier to draw off the fluid by the trocar. The next stage is when we find the clotting of the pus. In this stage I fancy that the difficulties of the closed method are apparent. These clots will not go through the trocar. There is where the Mozingo method is criticized, and that is where Muscovitz, of New York, claims his method is superior. The injection of a small amount of Dakin's solution into these cavities will not dissolve these clots. You must have much more Dakin's solution than 50 c.c, and you must have it injected at much more frequent intervals.

I had the advantage of seeing these cases at Camp Dodge and of seeing them also at the Rockefeller Institute, and I later talked with Dr. Muscovitz, who was at the Base Hospital at Fort Thomas, and saw him illustrating his method of technic at this hospital. Some of these cases had been transferred from Camp Dodge to Fort Thomas and they were working on these cases.

Let me refer just a moment to the question of Dakin's solution. If you look on the bottles in which you receive the powder which is to be dissolved in water and called by the manufacturers "Dakin's new antiseptic" you will be inclined to believe you are working with Dakin's solution, whereas you are not. You are working with dichloramin-T solution. They will tell you at the Rockefeller Institute that dichloramin-T has not the solvent action that Dakin's solution proper has. Therefore, if you have Dakin's solution it should be made in the hospital where you use it, it should be fresh, and should be Dakin's solution and not dichloramin-T. You can use dichloramin-T solution after you have obtained the effect that Dakin's solution gives you at first. Therefore, after you have opened the chest by whatever method you chose, and if it is a method which will allow sufficient Dakin solution to dissolve the products of the inflammation, you will get a rapid cure, but you should see to it that sufficient Dakin's solution is used to dissolve the products of inflammation.

DR. CHARLES H. MAYO, Rochester: I think these are two very timely papers because undoubtedly we will have another epidemic of the influenza the coming winter. The closed methods of treating empyema, I believe, have proven their worth.

I was in Washington when the great epidemic of influenza occurred, and we had many, many cases of the disease scattered all over the camps with empyema as a complication. We had in one of the southern camps one of the best surgeons in the east, and he had in mind the ordinary method of treatment of pneumonia-empyema. He made a great many operations with a mortality of 64 per cent. On the other hand, from the west we were getting reports of the Surgeon-General's Office of the marvelous results obtained by closed methods of treatment,

and then we started out some of the men from these places, medical men and surgeons, and placed them in the different camps to see if we could not establish some uniform method of treatment, and the treatment followed resulted in a material increased percentage of recovery. I want to say right here, that sometimes we may not be as charitable as we ought to be in considering epidemics. Great contagions often start out of all sorts, very severe, and gradually some degree of immunity comes from the contagion being carried from man to man, and as time goes on these cases are not quite so severe. But all types of contagion affect man more or less so that we have some advantage in that line of natural immunity develop.

I was very glad Dr. Mann called attention to the fact that there are two types of pneumonia, and that the old type of pneumococcus pneumonia often begins in those cases that have undergone lysis, and even after they had quite improved they were found to have their chests full of fluid. There is no question but what years ago some of these cases were cured by one or two aspirations of the chest done early in pneumococcus pneumonia. However, it was never a very popular method of treatment. It looked non-surgical in the early days, and yet that was done. But the case that lived through the early period of treatment might come to the time when thoracotomy or the open operation offers the best results of any method of treatment. That is bound to occur in a few cases and can be relieved best by rib resection, but it is always to be remembered it is in the unusual case, and not the usual case that we are to accept today the treatment of influenza pneumonia by the closed method, and any man who makes the early open method must be in a position to explain the reasons for the early treatment by the open method.

DR. THEODORE BRATRUD, Warren: There are some of these types of empyema following the influenza epidemic that will not respond to the Carrel-Dakin solution and only small drainage, and these cases, as we treated them at Fort Thomas Hospital, were irrigated every two hours, and these cases that would not go down and the cavity would continue enlarging in size we subjected to the resection of several ribs. Colonel Heygrove took over the empyema work after Colonel Muscovitz, and in a recent conversation about two weeks ago he condemned the trocar and cannula method completely. They looked up eight cases at the Walter Reed Hospital that had been treated by debridement, and all of them had recovered. Every single one of them had been reoperated and the eighth was to be operated very shortly.

There is one very important point which lies in the treatment of these cases, and that is the posoperative treatment. These cases should be put on breathing exercises. Blowing bubbles is one of the best exercises, and it is surprising how fast these men will increase their lung capacity and how fast the blowing of bubbles raises the number of pounds of fluid after they have once started. By means of these graduated exercises it is surprising to see how fast these men will be able to pick up in strength and gain weight.

DR. A. R. COLVIN, St. Paul: As to the question of empyema, the cases I saw were largely these of the chronic type in the hospital with which I was connected. In these chronic cases we obtained results from almost every kind of treatment. Later on, however, I saw the results of the closed and open method of treatment.

It seems to me, a point upon which too much stress cannot be laid is the permanency of the individual case, the type of infection, and the morphology of the organism, it seems to me, does not always tell us the virulence of that particular organism. Certainly, from the results I saw in the chronic cases, with old thick walled cavities, there were not many trabeculae of a thick walled cavity with a branching out in some direction of the main cavity. These cases required the most mutilating operations, and any improvement that can be made in the early treatment is to be hailed with delight. There is no question that any number of cases are cured immediately in the course of a month or two by the open method. I have had that experience myself, and a number of men have had it. There is no question but what aspiration in some cases will cure them, and the results will be excellent. My own feeling is in a very virulent stage that rib resection, with drainage just as soon as it has been established that drainage is necessary, is better for the patient.

Dr. Manson touched on the question of the Dakin solution, and I happened to be at the Rockefeller Institute with Dr. Manson when he was there, and I heard this remark or statement made by Major Stewart who was in charge of that work. He said that some cases died, but in those cases that did not die and were treated by the open method, followed by Dakin irrigation, all got well definitely; that is, there were no after-results; there were no chronic cases. They either got well or died. My own exprience with the most desperate cases was that I did not think it made any difference what we did. In some of the cases we saw from the first death was stamped on them, and if you did not do a thing they died from infection. If you resected a rib they died; if you aspirated they died. The milder cases recovered. I think the majority of cases of empyema recover if they have not the awful virulence of the organism stamped upon them from the first. The majority of them recover as far as immediate recovery is concerned, but the horrible part to the surgeon who has to deal with these cases afterwards are the chronic cases with the old thick-walled cavities. Major Stewart said positively and repeated it, that with the resection of the rib or ribs, with definite drainage and irrigation with Dakin's solution, there were not any complications, and certainly that is something to be wished for.

Regarding the Dakin's solution, Dr. Manson stated very truly that these tablets do not represent Dakin's solution. The course given at the Rockefeller Institute taught us how to analyze and to use Dakin's solution as it should be used, and the exact strength according to definite rules, otherwise it was not worth while to use it at all.

DR. STRACHAUER (closing the discussion on his part): The lesson to be drawn from the recent vast experience in the treatment of empyema is the great advantage of the principle and methods as outlined by Dr. Manson and myself. This is one of the greatest contributions to the civil practice of surgery derived from the military experience in the last epidemic.

As we are all agreed as to the value of the closed method of treating these empyemata, the subject requires no further emphasis.

Regarding the trephine operation: The advantage of the trephine opening through the rib is that the rigid wall of the aperture accepts a stiff rubber drainage tube so that it can be inserted into the opening as snugly and tightly as a cork in a bottle. The joint is airtight. The difficulty with the catheter drainage method is the greater liability of leakage about the catheter in the soft parts. In comparing the caliber of the drainage tube used in the trephine operation and the size of the catheter, the difference is as between the size of my ring finger and a Number 24 catheter. The trephine operation is new, and it is hardly fair to pass judgment upon any procedure without having witnessed or practiced such operation. In civil practice we do not get these cases at the very early period experienced in military practice, where, as a matter of fact, the treatment of the empyemata was anticipated. Those of us who were so unfortunate as to have to remain at home had to deal with the farther advanced cases in which the pus was, frequently, very thick and contained large masses of fibrin. The discharge in our cases, in the majority of instances, was too thick to be evacuated through a catheter. The large drainage tube the size of the ring finger as employed in the trephine operation permitted the discharge of such heavy, thick pus and chunks of fibrin.

The trephine operation admits of the application of negative pressure which removes the discharges by suction, aids in the obliteration of the cavity, and promotes the expansion of the lung. It is more simple than resection, and the introduction of the tube into the aperture, fitting as tightly as a cork in the bottle, provides an airtight joint.

DR. MANSON (closing the discussion): We must agree that the ideal treatment for acute empyema is the one in which the mortality is the least. Operative interference should be undertaken first and last and in which the fullest recovery is obtained. We claim for the closed method all of those attributes, and we think statistics will show the superiority of this method over acute empyema, especially of the streptococcus type. I do not wish to have it understood, however, that this method is limited to the streptococcus type. We had empyemata of the pneumococcus type, of the staphylococcus and streptococcus type, and all were successfully treated by this method. In one of these cases there was a recurrence of the empyema which came from the spring epidemic. Many of these cases persisted after open thoracotomy, and I wish to emphasize the point that while I have spoken of this method as an ideal treatment for acute empyema, it is also applicable to the chronic cases. We had several cases of chronic empyema in which we resorted to the closed method, closing the original wound and obtaining sterilization of the cavity in a very short time. One case returned from overseas that had an open sinus for six months, and it was closed inside of two weeks.

The criticism that the method is not applicable where there are fibrinous masses is answered probably in this way: Ideally, the treatment should be instituted when aspiration is made and it is found we have infected fluid. This means that we are aspirating before we have these fibrinous masses and we prevent the formation of them. However, if we do have, as we find in some of our cases, something happen to them we have no trouble from them. You can take these fibrinous masses and put them in Dakin's solution and they will be dissolved. Of course, we do not suppose this method will be carwhile I have spoken of this method as an ideal treat-Dakin's solution is a solvent of proteid material, and it will prevent the formation of these fibrinous masses and help to dissolve them, so that the use of the Dakin's solution early in the disease will not only prevent the formation of these masses but the formation of adhesions and the formation of secondary pockets.

There is no doubt but that a great many cases of empyema go undetected, and it behooves us, therefore, to be on the lookout, especially in the influenza cases, for the occurrence of infected pleural fluid very early in the disease, coincident with the onset of the pneumonic process, then the introduction of this method will obviate many of the difficulties we have in the cases that come to us later. With our catheter method we have had no leakage; the cavity remained tight.

THE CORRELATION OF LABORATORY WITH CLINICAL METHODS IN THE STUDY OF TUBERCULOSIS*

By F. W. Wittich, M. D.
Minneapolis, Minn.

Frequently, the clinician is not versed in the practical application of laboratory methods and

*Read before the Mississippi Valley Anti-Tuberculosis Association, St. Louis, October, 1918.

the laboratory worker is a poor clinician. This applies especially to those who were graduated a decade or so ago and who have established busy lucrative practices with no time to study the more recent diagnostic methods. Begging the pardon of those who lay stress on the common sense diagnosis of tuberculosis more from symptoms and without the use of the microscope and the stethoscope, I might state that it would be a proper procedure for one deaf and blind but hardly applicable in the present age.

The successful clinic today depends upon the practical application of the newer diagnostic methods as furnished by the laboratory, which extends its use into the fields of investigation. This applies to the universal disease tuberculosis as much as it does to the more recent observations of diseases of metabolism. It is especially useful in the study of tuberculosis as an infection or disease in the broader sense of including a more or less general or localized disease in various organs, bones, glands, etc. The tuberculosis specialist who restricts his observations to pulmonary disease is sadly limited in his work with the disease produced by the bacillus of Koch.

It is surprising upon what a slender basis the diagnosis of tuberculosis is sometimes made by placing the greatest emphasis upon relatively insignificant signs. For instance, the diagnosis of pulmonary tuberculosis on dullness at one apex probably may be justified in civil life, but surely would not be so in military life as Colonel Bushnell has recently pointed out. To justify such a diagnosis on the grounds that the rest and change of air will be beneficial and at least not harmful, is not scientfic. It is taking advantage of the fact that it is easier to call a condition tuberculous than to prove it otherwise. Two cases recently came to my observation which had been diagnosed as pulmonary tuberculosis by reputable internists. Being unable to find any evidence of the disease in one case and slight if any, in the other, I referred the patients to a renowned tuberculosis center with the result that after thorough examinations with the abundant methods at hand, the former was told that she was free from the disease and the latter that they would not like to be asked to make a definite statement concerning the location of his tuberculosis. It is incidents such as these that make one desire for uniformity in methods and standards of diagnosis with a better understanding of clinical and laboratory means in arriving at safe conclusions. No one will doubt the absolute necessity of a carefully gleaned history, the grouping of symptoms, and a painstaking physical examination augmented if possible by the fluoroscope or roentgenogram, but all these may fail. The protean manifestations of the disease may obscure our perspective and be entirely misleading. After a most careful study of the troops, medical military observers were surprised at the number of demonstrable pathological lesions without symptoms of disease and with histories of nothing but good health. This is especially true in cardiac lesions and were all the men subjected to a roentgenogram of the lungs it would no doubt be verified in tuberculous ones also. If all the men who are tuberculin sensitive were condemned there would be great confusion.

It is a well balanced judgment of the value of any test, clinical or laboratory, in a particular case that makes for accurate diagnosis. On applying the various laboratory tests one must have clearly in mind just what information he seeks. As stated, the patient's history, percussion and auscultation, the thermometer and scale as well as both radioscopy and radiography may fail to clinch the diagnosis between a definite disease requiring active therapeutic measures and an infection severe enough to indicate what Lawrason Brown calls a God-fearing life.

What other means have we that may aid us, yield a clue, strengthen our convictions, augment facts and give us assurance?

Obviously, the first aid is the microscope. Since the classical observations of Koch that led up to his discovery of the tubercle bacillus, the microscope has placed on a scientific basis and beyond all controversy what Laennec had so brilliantly crystallized into an accurate clinical grouping. It is now relatively simple to examine any fluid or tissue of the body for the tubercle bacillus. The adoption and persistent use of one method is better than to have the laboratory posted full of directions never practiced, and an attempt shall be made here to describe one method which has proved satisfactory for each test.

The acid fast properties of the tubercle bacillus or its resistance to decolorizing by acids is

so well known that the writer begs indulgence for mentioning it, yet many cannot make a good sputum smear and stain it properly. Without entering into the details of a good microscope, clean slides, properly standardized reagents, etc., I should like to mention the necessity of selecting cheesy-appearing or heavier particles of pus from a sputum specimen and compressing them firmly between two slides so that a thin uniform film is the result. Tubercle bacilli will frequently be demonstrated in a smear made by observing these hints when less carefully prepared slides from the same specimen were repeatedly negative. Steaming the stain on the slide for five minutes (don't defer your diagnosis another day by staining in the cold), decolorizing with 3% acid alcohol and counterstaining, not too deeply, with Loeffler's methylene blue always makes a good slide whatever the material. If negative, a simple concentration method such as digesting the sputum in an equal part of 30% antiformin for about an hour then sedimenting and staining in the usual manner may demonstrate the tubercle bacilli. Feces, and pus from cold abscesses or suppurating glands are best examined in this way. Fine sediments from digested material or from urine can readily be fixed in a thin smear of egg albumin preserved in 5% carbolic solution. Sedimentation of the tubercle bacilli in urine is greatly hastened by the addition of one-third alcohol before centrifuging.

All expectoration from the bronchi is pathological and should be examined for tubercle bacilli, which examination of sputum is necessary for the proper classification of all patients. Even if the chest shows undoubted evidences of the disease the finding of tubercle bacilli in the sputum, which is many times the only conclusive proof of the disease that will be accepted by the laity, makes it necessary to take measures for the protection of others as well as for the safe-guarding of the patient from reinfection. What significance have bacilli in the expectoration regarding prognosis? Heise recalls the fact that in an open case or when tubercle bacilli occur in the sputum, "new areas may be infected by aspiration or by back pressure during cough. The lesion then is a more dangerous one although unaccompanied by symptoms of activity." In such a case there is also less chance of the focus being inactive and greater danger of relapse. In group studies of 1400 cases whose fate was known ten to nineteen years after discharge from the sanatorium, of those who had definite tuberculosis but no bacilli in the sputum 81% were alive; of over three times that number, who had bacilli present, only 59% were living; or, roughly speaking, the chances of those with positive sputum are lessened about 20% over those whose sputum is negative.

When tubercle bacilli are found, and they were found in 71% of Heise's 1,400 cases, what further study of the smears will be of value? Joseph Pottenger in 1917 drew attention to the value of interpreting the degree of bunching of tubercle bacilli; their relative length and staining characteristics; their relative number and the degree of phagocytosis of bacilli by the formed elements native to the sputum.

Working largely with cases of advanced pulmonary tuberculosis he evolved a system of sputum analysis which gives a more thorough complete picture of the degree of activity and extent of involvement than has been offered by other laboratory methods. Further than this it has made it possible to interpret with a greater degree of certainty many of the symptoms and complications both tuberculous and non- tuberculous which occur during the course of the disease.

His ingenious technic of measuring the bacilli, etc., is described in Pottenger's *Clinical Tuberculosis* which is readily accessible. Briefly, the method of sputum analysis consists of correlating the various findings quantitatively of a total twenty-four hour, two-day or three-day sputum and is described as follows:

"The sediment volume is a measurement of the cellular elements of the sputum; the number of bacilli is expressed by the product of the number per field by the number of cubic centimeters of sediment volume; the length index of tubercle bacilli is a number expressing the relative length of the bacilli; and the albumin content is expressed by multiplying the denominator of the fraction representing the dilution recorded by the total number of c.c. of sputum, i.e., in sputum of 50 c.c. which gives the standard reaction for albumin at 1/20 dilution the relative albumin content would be expressed by 1/20x1/50 1/1000. In following the course of uncompli-

cated tuberculosis, the sediment volume and length index are by far the most important determinations; the former expressing the extent and the latter the degree of activity of the disease."

Pottenger continues with the statement that when there are complications the relative number of bacilli is an important aid. In pulmonary abscesses when there is an appreciable increase in the sediment volume the number of bacilli remains constant or diminishes. When tuberculous laryngitis develops the total amount of sputum is greatly augmented while the volume of sediment, bacilli number and length index remain the same unless a cavity forms in the lung simultaneously. Any non-tuberculous complication causing an increase of laryngeal or bronchial secretion may be differentiated from cavitation by determining the sediment volume. The sediment volume of epithelium due to catarrhal conditions rarely exceeds five tenths c.c. while the leucocyte volume in moderately advanced cases ranges from 1 to 5 c.c. and from 5 to 10 c.c. in far advanced cases. In lung abscess the volume is 25 c.c. or more. Pottenger's observations agree with those of others concerning the albumin content of the sputum in that it seems to indicate activity although its determination proves of least value. Cytological studies of homogenized sputum made by shaking two to five minutes showed that the lymphocyte count increases with the abatement of clinical symptoms coincident with diminished sediment volume and the raising of length index of the bacilli.

The relation between clumping of the bacilli and activity has been shown. Clumping is an index of increased activity and as the bacilli become longer the bunching becomes less. In brief, if a patient is not doing well the sediment volume becomes greater, there is a larger number of bacilli, there is more sputum, the albumin content is higher and the number of the shorter rods is increased. To determine the length index of 300 to 500 bacilli requires five to ten minutes and the chemical tests mentioned will take from ten to fifteen minutes longer.

Holmes and Chambers' method of determining the albumin content in the sputum is as follows: Place 10 c.c. of sputum in a 50 c.c. graduated glass-stoppered bottle. To this add three times its volume of water containing 1% acetic acid, diluting the sputum to 25%. After shaking vigorously, filter 10 c.c. through a filter paper directly into a graduated centrifuge tube. Add to this 5 c.c. of a 5% potassium ferrocyanid solution in water and centrifuge for 5 minutes at average speed. The amount of albumin is conveniently recorded in volume percent, each tenth c.c. in the tube being 4% by volume after correcting for the original dilution. Many use the Esbach albuminometer and Esbach's reagent as in urine. It has been shown that when the volume percent of albumin in the sputum exceeds one or two percent and there is a sputum lymphocytosis of 50% or more, a tentative diagnosis of pulmonary tuberculosis is justifiable even though the tubercle bacilli may not have been found.

A study of the secondary organisms in the sputum may prove of value when there is an increase in symptoms. For instance, in sputum examinations of 196 patients by the writer the staphylococci, being lytic, were frequently found in those chronic cases with cavity formation, limited toxic effect and low pyrexial symptoms, but the organism is low in its acceleration of the growth of tubercle bacilli. The pneumococcus, containing both endo and exotoxins but showing some lysis, produces more marked toxic effects and less cavitation, and it is next to the streptococcus in its accelerating power of the growth of Koch's bacillus. The catarrhal group of Gram-negative diplococci represented by the m. catarrhalis, with no lytic power or exotoxin, produces catarrhal symptoms principally as well as slight pyrexial symptoms although there may be some excavation. This group stands about fourth in its power of stimulating the growth of tubercle bacilli. B. influenza with its powerful endotoxin, produces marked pyrexial symptoms but little excavation, and it ranks next to the pneumococcus in activating the growth of tubercle bacilli. The severity of the infection would depend on whether one or more of the secondary organisms were present.

A study of blood in tuberculosis is of unquestionable value. The researches of Arneth calling attention to the morphology of the nucleus in neutrophil leucocytes especially in tuberculosis stimulated many observers to con-

tinue this line of investigation and their results have been in the main confirmatory. Arneth developed the theory of changes in the nucleus during growth of the neutrophilepolymorphonuclear leucocytes and divided the neutrophiles into various classes according to the number and shape of the nuclear segments. In various diseases the differential count of the neutrophiles very often shows an abnormal predominance of the younger forms of the cells which he calls a shifting to the left in his blood picture. This shifting is very characteristic and represents a definite reaction on the part of the organism to the infection.

Miller and Reed studied 78 cases making 315 counts. They found that the normal picture was as follows, the Roman numerals representing the number of lobes to the cell and the Arabic the percentage of cells: I/5 II/26 III/36 IV/28 V/5 making a normal index of 49:51 using classes I and II and a half of class III as one side. Thus any index between 45:55 and 55:45 may be called normal. In tuberculosis there is an increase in the single or two lobed cells and a decrease of III, IV, and V. Further there is a shifting to the left as the disease progresses, the average ratio for an incipient case being 64:36; advanced 67:33; far advanced 75:25; and the moribund 66:34. A good prognosis shows 60:40 and a poor one, 72:28.

The technic, as in all accurate work, must be uniform, the specimens of blood obtained in the afternoon three or four hours after eating, and other causes of leucocytosis, as cold baths, etc., should be avoided. The blood smears must be thin and even, fixed and dried in the air. Use fresh Wright's stain. Cover slide two to three minutes and then dip several times into distilled water to which Wright's stain has been added to distinctly color until exact shade of film is obtained. One hundred neutrophiles are counted with each operation.

A case progressively becoming worse will show a leucocytosis, an increase in the neutrophiles, a decreased percentage of small lymphocytes and eosinophils and shifting to the left of the Arneth blood picture. A case progressively improving will present a directly opposite picture.

According to Burgess, the presence of a high percentage of immature polynuclear leucocytes in the circulating blood (Arneth's "shifting to the left") is evidence of excessive loss of these cells from the blood stream and an attempt on the part of the bone marrow to make up the deficiency. It does not indicate the degree of toxemia nor is it an index of the patient's resistance to infection. In tuberculosis a shifting to the left means necrosis and extension of the lesion. In early cases it may be of considerable value in immediate prognosis and even at times in diagnosis. In advanced cases there is so much of a variation and so little information that is not already possessed that it is of no value. However, leucocytosis is evidence of toxemia and of a definite value, and a lymphocytosis is suggestive of tubercle bacilli stimulaton, so that an Arneth count that may be done simultaneously with a differential count, may be worth the time spent on it in certain cases.

If tubercle bacilli are not found in the sputum examine the stool, as they may be demonstrated in the feces sometimes before being discovered in the sputum. Approximately 60% of cases with positive sputum with no symptoms or signs of intestinal tuberculosis will have the bacilli in the feces. Sometimes a patient unconsciously or willfully swallows sputum and denies expectoration, so that a stool examination under the pretext of studying some bowel condition may give results. Stool examination for tubercle bacilli is also of value in children with tuberculous bronchial ulceration and from whom it is difficult to obtain a specimen of sputum. The antiformin method of digesting the feces as in sputum concentration is very satisfactory, yet plain smears show them as well. It is best after decolorizing not to counterstain where there are such large numbers of other organisms. The tubercle bacilli stand out against a white or colorless background.

Certain urinary findings may be of value in differential diagnosis as well as in confirming previous impressions. Weisz, in 1911, noted a marked increase in urochromogen in the urine of tuberculous individuals. Since then many observers have obtained such contradictory findings that it is doubtful if the urochromogen output is in any degree a measure of tissue destruction. According to Weisz the normal

pigment of the urine is derived from chromogen, and when this is oxidized, as by a solution of potassium permanganate, it is changed to a pure urochrome of the urine.

To make the test is simple. Dilute five cubic centimeters of urine with ten cubic centimeters of water. Pour half into another tube for comparison. Add two or three drops of a dilute (1-1000) permanganate solution. A positive reaction is indicated by the appearance of a distinct yellow color that persists. The reaction is present in typhoid as the diazo-reaction and so is not specific for tuberculosis. It is probably of more value as a negative than as a positive test, for a negative reaction is obtained in a much higher percentage of non-tuberculous cases than a positive reaction in the tuberculous ones.

The urinary findings in functional renal tests in tuberculosis have been proved valuable by Mills and Henderson. This is especially true of genito-urinary tuberculosis. They have found that renal tuberculosis and apparently extra-renal genito-urinary tuberculosis give a characteristic picture with Mosenthal's test that may be of help in diagnosis. Genito-urinary tuberculosis may show an altered renal function with the Mosenthal test, when the other tests in this condition, or even the presence of albumin or casts may show little or no decrease in function. This test has given a characteristic picture in renal tuberculosis before the development of any clinical symptoms.

In uncomplicated pulmonary tuberculosis functional renal tests are of little value, but when there is any suspicion of nephritis or genito-urinary tuberculosis, or when the urine shows albumin beyond a trace or casts other than hyaline, even in the absence of clinical symptoms, a Mosenthal test and a phthalein test should be made for the valuable diagnostic and prognostic helps they may afford.

The test essentially consists in giving a three meal standard diet two or three days preceding, which diet contains approximately 1760 c.c of fluid, 8.5 grams of salt and a normal amount of protein. The urine is collected at two hour intervals from 8:00 A. M. to 8:00 P. M. and the total night urine, from 8:00 P. M. to 8:00 A. M. Measure the amount of each specimen and take the specific gravity. The amount of salt in the total day and night specimens may be determined but is not necessary for diagnostic purposes. Normal function shows the following: The night urine should not exceed 400 c.c. in amount, the specific gravity of the night urine should be 1.018 or over, and there should be a range of at least nine points between the highest and lowest specific gravity. The water excretion also shows a wide variation between the two-hour intervals. In disturbed renal function due to disease, the kidneys act less like a functioning glandular organ and more like a mechanical filter. The night urine is increased with a low specific gravity and there develops during the day fixation of volume and specific gravity, or in other words the two hour daily output and specific gravity become more constant.

Many attempts have been made to adapt serological methods in the diagnosis of tuberculosis as in syphilis, and much interest has been aroused recently in the complement fixation test in tuberculosis. The observations, as initiated by Bordet and Gengou in 1903, and by the early investigators such as Wassermann and Bruck and Citron were far from uniform because of technical difficulties. Aside from sporadic observations the subject did not promise particular results until improved methods were introduced the past few years. The proposal of various antigens and modifications followed so quickly the nearly specific results of Besredka and the users of his antigens or modifications, particularly the French observers, as well as Craig and Bronfenbrenner, that the literature of the subject has become very extensive. Antigens of bacillary suspensions, filtrates or tuberculins, and various extracts as well as different tissue extracts have been used. More recently the observations of Miller and those of Petroff would indicate that the complement fixation test in tuberculosis is approaching the much desired specific quality.

The writer attempted to employ these modern methods of the fixation test on a hundred cases using various antigens both in the fixation and skin tests. The results of this work have been reported elsewhere and they have been very encouraging. The subject is too broad a one to be discussed here but briefly. It may be stated that with a careful selection of antigens

and uniform methods the results have pointed toward a practical use nearly as valuable as the Wassermann test in diagnosing syphilis. It must, however, be kept in mind that there will always be difficulties in the diagnosis of tuberculosis by biological methods as Bronfenbrenner has pointed out. Even when specific in character these biological tests, the Pirquet test for example, do not differentiate between tuberculosis as an infection and tuberculosis as a disease.

In practice I have come to use a routine complement fixation test and intracutaneous test on all doubtful or concealed cases of tuberculosis. Besredka's or Miller's antigen is used in the fixation tests and Koch's O. T. 1/10 c.c of a 1 to 100 dilution intracutaneously. A three or four plus positive reaction together with a definite cutaneous response is considered sufficient evidence of tuberculosis to be treated as such until proved otherwise. Petroff's antigen is used to determine latency. The value of these tests when negative, particularly of the various skin tests must be recognized by everyone.

The time will not permit more than a brief mention of other laboratory methods employed toward helping to diagnose tuberculosis. Animal inoculation, bacteriological studies of the blood, the pulmonary differential test known as the salicylic test of Falk and Tedesco, the study of the ferments of the sputum, etc., all have some value and are worth investigating.

The internist may remain unconvinced of the value of correlating laboratory tests with clinical findings and feel that the former are not necessary or perhaps too complicated and time-devouring to warrant their trial, but when he faces the case, and I do not deny it is most frequently the exceptional one, where his skill in clinical work refuses to help him make a satisfactory diagnosis then let him turn to the laboratory. If he will investigate the unlimited opportunities it affords him to study that patient and so a whole new class of them, let him try out these various tests, let his interest be fully a roused to their possibilities and he will make time to work out some of the problems his enthusiasm has opened up for him. With the new found knowledge of the data his observations will furnish him he will have a broader and firmer information of the subject at hand, and his perspective in the study of a most interesting yet elusive disease will be greatly enlarged. He will then refuse to become stagnant in his practice of medicine but will rise out of the rut of routine and study the problems that make for scientific progress.

EPIDEMIC INFLUENZA: REPORT OF 296 CASES AT THE UNIVERSITY HOSPITAL, MINNEAPOLIS, MINN.

By Edgar T. Herrmann, M. D.
St. Paul, Minn.

The object of this report is to summarize the influenza epidemic as seen at the University hospital from October 11th to November 11th, 1918, inclusive. The paper is based on the study of 296 cases chosen during the month when the epidemic was at its height. For the sake of simplicity the results of our investigation will be presented in tabulated form.

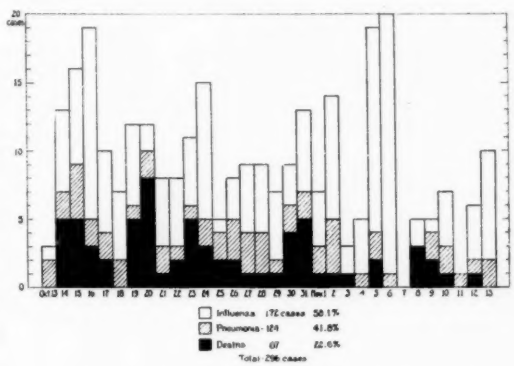


Chart 1 shows graphically the number of cases of influenza, pneumonia and deaths on each day during this period. It will be seen that the time from October 14th to November 3rd, that is, the first 22 days, represent the height of the epidemic. October 20th shows eight deaths. This day represents the acme of fatalities as well as admitted pneumonias. It is important here to note that many of the pneumonias admitted were practically moribund on entrance and the computed figures are based on all pneumonias, whether these were contracted inside or before coming to the hospital. (The percentage values are given in the figure.) The death rate

in pneumonia reaches 54 per cent, but is not strictly accurate as the fatality proportion under treatment, because of the large number of cases admitted in a dying condition.

SUBJECTIVE SYMPTOMS

Characteristic of practically all cases was sudden on-set, weakness and marked and immediate prostration. Headache, backache, general body pains, and pains in the extremities, were mostly either all or partly present. A large number of patients complained especially of chest soreness, usually substernal. Chills and sweats were found less frequently. Tinnitus and vertigo were occasionally parts of the picture. Gastro-intestinal disturbances ocurred in a certain number of admissions and were marked by nausea, vomiting, anorexia and diarrhea. On the cardio-respiratory side, coryza, cough, sore throat, chest pains on expectoration, formed the dominant picture. In a few cases nocturia was a prominent symptom.

PHYSICAL FINDINGS

1. Simple Influenza.

Here the usual findings were:

(a) Conjunctival irritation of all degrees.
(b) Dry, raw or beef-steak naso-pharynx, tongue and tonsils.
(c) Occasional epistaxis.
(d) Occasional slight cyanosis.
(e) Slight acceleration of pulse and respiration.
(f) Occasional moist and dry rales over the larger bronchi.
(g) Occasonal vertigo.
(h) Usually marked abdominal flatulence.
(i) Usually constipation, less frequently diarrhea.
(j) Occasionally abdominal pain and tenderness.
(k) Occasional psychic disturbances with low temperatures.

2. Pneumonia.

(a) Cyanosis—This ominous and striking sign was present in at least half the cases. During the height of the epidemic cyanosis was an almost invariable harbinger of fatality. Peculiarly, it was often present from one to three days before any objective signs of consolidation could be determined, also it was practically never accompanied by evidences of right heart dilatation. This sign will be mentioned again in connection with chemical studies of the blood.
(b) Marked acceleration of respiration and pulse was constant and often present some time before objective consolidation appeared.
(c) Sputum—This was thick, tenacious, muco-purulent and blood streaked, and came up as plugs in a thin pearly colored fluid.
(d) Consolidation—As Christian has observed, we found that the pneumonic process was usually first discovered at the scapular angles behind, spreading from that point. All degrees of involvment were noted, from patches the size of a dollar to a massive infiltration of both lungs. The advancing order of physical signs was usually:

1st. Slight suppression of breath sounds over involved area.
2nd. Slight impairment of resonance to percussion.
3rd. Subcrepitant and crepitant rales.
4th. Bronchovesicular and b r o n c h i a l breathing with percussion dullness.

(e) Severe epistaxis and bleeding from the gums was occasonally met with.
(f) The tongue presented a dry, furred, brown and cracked appearance, as did also the lips.
(g) Striking abdominal distension was always present.
(h)) Emesis and diarrhea were marked in certain cases.
(i) Talkative delirum and uncoordinated muscular twitchings characterized the end stage of some pneumonias.
(j) Pulmonary oedema was often present.
(k) Cardiac dilatation with right heart failure was rarely present.

BLOOD PRESSURES

1. Blood pressures in cases of influenza were taken on 44 individuals, the group average showing a systolic pressure of 108 with a dyastolic pressure of 58.
2. Thirteen cases of severe pneumonia gave very low readings, viz: an average systolic pressure of 95, with a dyastolic pressure of 56.

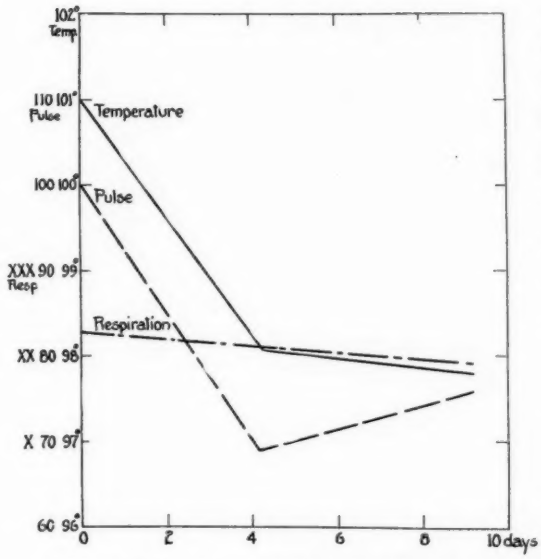


CHART 2 is a composite graph of pulse, temperature and respiration reactions in 172 cases of simple influenza. The high points represent values on admission. The graph thus shows the return of temperature and pulse to normal on the fourth day after admission, the drop usually occurring by sharp lysis. The average patient was not discharged until five days after this period, i.e., on the ninth day after admission. Respirations throughout were practically normal.

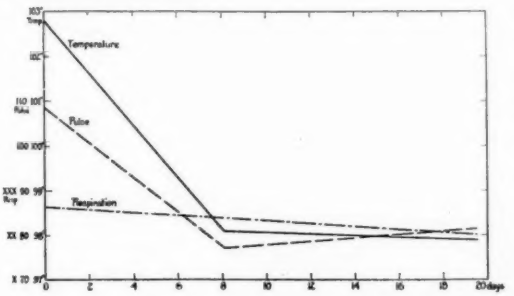


CHART 3 shows an average for 124 cases of pneumonia with recovery. A comparison with Chart 2 reveals the very interesting fact that the time element in pneumonia is practically double that of influenza; thus in pneumonia the drop in temperature and pulse occurs on the eighth instead of the fourth day. The average patient was kept in the hospital eleven days after this period, a total of nineteen days. *Insofar as averages can be considered valuable, this means that an influenza which continues febrile over four or five days should be considered as a pneumonia, in spite of the absence of physical findings.* Here again the drop is by sharp lysis, the pulse falling to 76 instead of 68, as in the former chart. The respiratory rate of 26 on admission usually falls to normal within 12 hours of the accompanying temperature and pulse decresence.

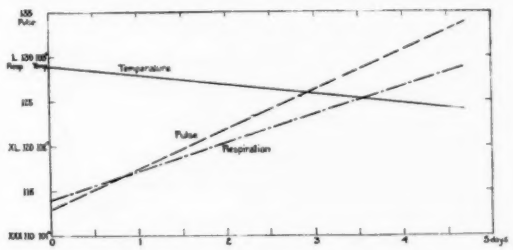


CHART 4 portrays the reaction in fatal cases. Here the length of life after admission is a little over four and a half days; however, one should remember that this is perhaps too brief an interval in many cases, since this graph is modified by records of individuals moribund on admission. The fatal crossing of temperature on the one hand, and pulse and respiration on the other, occurs here on the third day.

BLOOD STUDIES

Leucocyte counts were made in all cases and in many also complete blood counts and hemoglobin estimations were determined. Here for the sake of accuracy leucocyte counts on 20 cases are presented. These were hospital nurses with simple influenza who were put to bed on the first day of the disease, the counts being made on the first or second day by Dr. Warwick, hospital pathologist. They show a uniform leucopenia averaging 5,775 leucocytes per cubic millimeter.

Outside of this series the highest count recorded is one of 28,000 in a case of empyema. Many of the pneumonias showed leucopenia, few gave counts over 10,000.

The differential count, red cells and hemoglobin, remained normal in practically all cases.

URINE

1. Urine in cases of simple influenza was normal throughout.
2. Cases of pneumonia showed urine containing albumin often in large amounts, hyalin

and granular casts, and occasionally red blood cells.

BLOOD CHEMISTRY

Chemical blood studies were made in a series of 20 cases. Urea, nitrogen, creatinine and uric acid show practically no increase over the normal, thus nitrogen retention is clearly ruled out. Only one case showed a creatinine over three milligrams. On the other hand, there was a marked variation in the alkaline reserve. The fatal cases in the series studied for the most part showed a high alkaline reserve, at times approaching alkalosis; others showed a lower reserve. The variation was from 50.19 as highest figure, to 37.2 as low figure. Nine cases showed figures above 45, and four cases showed figures below 40. In none of the latter was clinical acidosis evident. The fact that many of the patients with high values were pushed to the limit of tolerance with salicylates in combination with sodium bicarbonate may explain some of the high values; however, low values were obtained under the same conditions. The explanation of the cyanosis on a basis of acidosis was thus found untenable.

BLOOD CULTURES

A series of blood cultures was taken on 15 patients with fatal pneumonias, the cultures being obtained at the height of the infection. Of these, three were found positive, the organism recovered being a pneumococcus.

BACTERIOLOGY

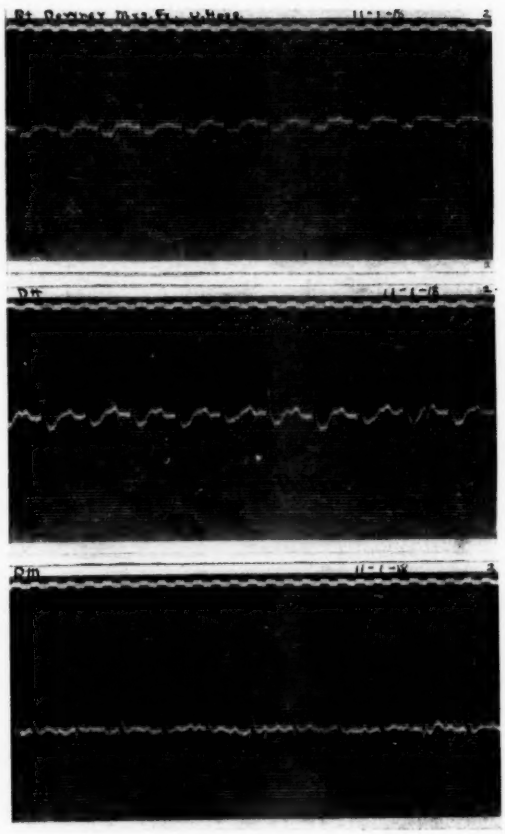
Dr. Larson, university bacteriologist, has made extensive studies of this phase of the epidemic. Briefly, his results on hospital cases have shown:

1. Sputum examinations that yielded pneumococci and streptococci together with, in some cases, influenza bacilli.

2. Blood cultures in cases of early pneumonia that were for the most part negative, some, however, showing pneumococci of types 2, 3 and 4, and other streptococci, occasionally hemolytic, often nonhemolytic.

TREATMENT

General measures instituted in every case consisted of absolute rest in bed, a high carbohydrate diet, forced fluids and free catharsis. Occasionally for the control of high temperatures sponge baths and Priessnitz compresses were employed.

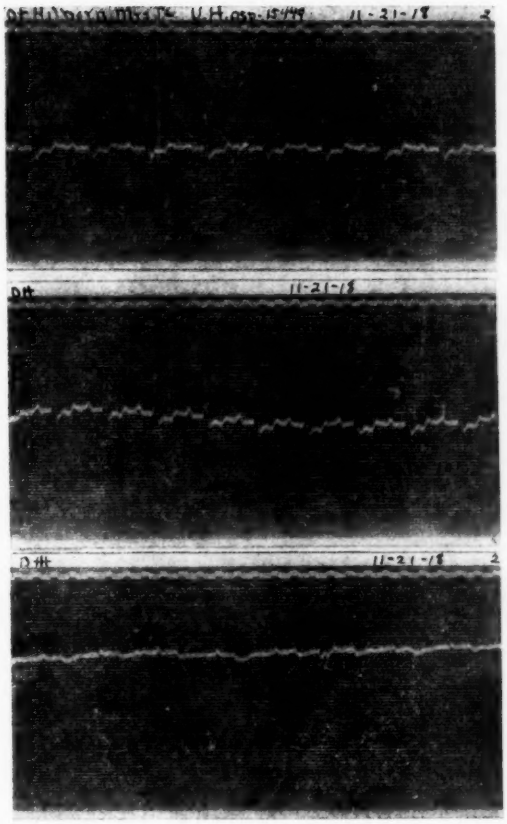


CARDIOGRAMS

Two cardiographic records are appended.

No. 1 is reproduced as of interest because it shows auricular extrasystoles in the second lead, as well as a lengthened P-R interval and partially inverted T wave. The two latter are digitalis effects; the former most probably an index of myocardial toxicity, which is also evidenced by the limited excursions of the galvanometer throughout. The patient was one with empyema following pneumonia from which she did not recover.

No. 2 is shown principally to illustrate how efficiently digitalis therapy was carried out in chosen cases. The drug was given in certain cases to study its effects, if any, on cardiac rate, but was found unsatisfactory. The cardiogram shows a rate unaffected by digitalis even though a lengthened P-R interval and an inverted T wave point to a maximal therapeutic effect of the drug.



Measures used to combat the infection directly may be listed as follows:

1. Drugs.
   (a) Salicylates.
   (b) Quinine derivatives.
   (c) Atropin.
   (d) Supportive and adjuvant drugs.
2. Vaccines.
3. Phlebotomy with infusion of Fischer's solution.
4. Convalescent serum.

Drugs—A careful comparison of all cases in which drugs were used leads one to the general conclusion that none were efficacious in combating the infection. Groups were established, some of which received only quinine derivatives, others only salicylates, and still others that received no medication whatever. When used the drugs were pushed to the limit of tolerance. A comparison of temperature and pulse curves in the three groups shows no appreciable difference between them nor is there any evidence to show that the course of the infection was made shorter by either of the drugs used. As a possible preventive of pulmonary oedema, atropin sulphate subcutaneously and by mouth was given in heavy doses. In severe cases 1/25 gr. was given twice a day for two days. The value of atropin for this purpose is very doubtful. A review of the cases shows that pulmonary oedema developed in certain ones in spite of its use and remained absent in others where atropin was not used. Judging from physical signs there was only one case in which it was felt that the use of atropin aborted a beginning oedema. Adrenalin and pituitrin were used in a few cases for the same purpose but without definite effect. Supportive and adjuvant measures employed consisted of digitalis, strophanthin, caffeine, camphorated oil and adrenalin on the cardiovascular side; codein and its derivatives and expectorants for the control of cough; morphine in chosen cases as a sedative; and glucose enteroclysis with saline to aid metabolic and water loss. These it is felt, were all of temporary value only.

Vaccines—Rosenow's vaccine and a mixed vaccine of the same type prepared by the department of bacteriology of the university, were used in 15 cases. The vaccine was given subcutaneously in one-half to one c.c. doses usually on three or four successive days after admittance for the possible prevention of pneumonia in cases of influenza. It was used also in cases of pneumonia. Here again the results obtained are questionable. One can only say that in a few cases, four to be exact, there was a definite drop of temperature and pulse on the day following injection. Eighty per cent showed no demonstrable improvement.

Phlebotomy with Infusion of Fischer's Solution—This was employed in 23 cases to relieve toxicity and circulatory embarrassment. Twenty-one of the cases had a fatal issue.

Convalescent Serum—Intravenous injection of serum was used in only one case and here proved unsuccessful. The single case admits no inference.

The course of the disease as observed in 20 nurses who were put to bed on the first day of illness shows that this measure, together with good nursing and general eliminative methods, was perhaps the most satisfactory. Two of these

nurses developed pneumonia and one died. Thus it appears that patients who were put to bed immediately on developing symptoms had in this measure the best of all safeguards against fatality. Here I might add that during the epidemic every nurse on duty was compelled to report morning and evening to have the temperature taken. On the appearance of the slightest rise above the normal, the nurse was at once ordered to bed. Herein perhaps we have the greatest safeguard against a serious issue.

COMPLICATIONS AND SEQUELAE

These are briefly summed up in the following list:

		Cases	
1.	Otitis media	9	
2.	Otitis with mastoiditis	1	
3.	Frontal sinusitis	3	
4.	Empyema	4	(3 died)
5.	Acute nephritis and myocarditis	6	(6 died)
6.	Edema of glottis	1	(1 died)
7.	Encephalitis with otitis	1	
8.	Toxic icterus	1	(1 died)
9.	Acute myocarditis	1	(1 died)

PATHOLOGY

A brief summary of findings on 30 autopsies as performed by Dr. E. T. Bell of the department of pathology and studied by him, shows:

1. Aside from pneumonia only two fatal sequelae were found, one a case of generalized pulmonary oedema with bacteriemia, and one a suppurative case of streptococcic pleuritis and pericarditis. Both of the latter cases also had pneumonia.
2. Hemorrhage was a prominent feature in 23 of the 30 cases.
3. Edema was present in 20 cases, varying from a small amount in the anterior portions to extensive involvment of both lungs.
4. Interstitial pneumonia was found in three cases.
5. Cultures from the lungs in 15 cases showed pneumococci thirteen times and streptococci twice in pure culture. No influenza bacilli were found.
6. Dr. Bell states that "the pathologic evidence supports the clinical observation that the infection first develops in and around the bronchi. The coalescence of these peribronchial areas gives rise to complete lobar consolidation. The small amount of fibrin usually found also supports the interpretation of a broncho-pneumonia."

SUMMARY

1. A total of 296 cases shows 58.1 per cent of influenza, 41.8 per cent of pneumonia and a fatality on all admissions of 22.6 per cent.

2. The average febrile period of simple influenza is four days, that of pneumonia eight days.

3. Fatalities usually occur on the fourth day of the disease.

4. Blood pressures in epidemic influenza and pneumonia are lower than normal.

5. In simple influenza and many pneumonias, leucopenia is the rule, while hemoglobin, differential counts and red cells remain normal.

6. In simple influenza the urine is clear. Cases of pneumonia, however, show albumin and casts, and occasionally red blood cells.

7. Chemical studies of the blood in this disease show no nitrogen retention, but an occasional high alkaline reserve is present in fatal cases of pneumonia.

8. Blood cultures in early pneumonias are usually negative, only occasionally showing pneumococci and streptococci.

9. Sputum examinations show pneumococci and streptococci as well as occasionally the influenza bacillus.

10. "Specific" medication as used at the university hospital proved of no value. On the other hand, early confinement to bed, good nursing and free elimination appeared to be the most important measures in the treatment of influenza.

11. Pathologically, fatal cases show a massive broncho pneumonia.

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EDITORIAL

GROUP MEDICINE

The scope of the study and practice of medicine has so enormously increased that no individual can hope to keep abreast of the times in all branches or become expert in every line. The absolute necessity for real specialists is undeniable. This fact has been recognized for several decades and became apparent with the marvelous development of surgery.

Of late the specialists have multiplied incredibly and with the change certain evils have crept in. Not the least of these has been the development in most of the larger communities of pseudo-specialists, individuals without special training or experience who are preying on an uninformed public.

There is another and perhaps more insidious danger in this specialization which must be apparent to any observing individual. We are all acquainted with specialists who can be depended upon to find some abnormality in the realm of their specialty in any patient; the surgeon in the appendix, the internist in the heart, the rhinologist in the tonsils and so on ad nauseam. This rather remarkable situation is a result not always of dishonesty in a financial way but dishonesty intellectually. The specialist is too prone in looking for trouble in his field; to take the mental attitude that his special organs are guilty until proven otherwise: in other words to make a diagnosis and then by a method of deductive reasoning make the symptoms prove his diagnosis.

The value of medical consultation has long been recognized. With the development of so many specialties the organization of groups has been the natural result. Their value if rightly conducted is undeniable. Some groups are being run like a machine with apparently little brain coordination and supervision. The patient enters the mill and presto emerges with a list of diagnoses potential and definite. If suffering from an acute condition requiring immediate treatment valuable time may be lost although the diagnosis is most likely made.

Dr. Barker* in an excellent article has pointed out the great need in any group for a physician of wide experience whose function should be to correlate all the acquired information furnished by various members of a group and logically to determine the main trouble and dictate the most important line of treatment. This man he calls the integrator. Any patient applying to any member of the group is referred to the integrator who suggests the special examinations he deems indicated and finally sums up the case and advises the necessary treatment.

Only in some such way are we likely to avoid pitfalls incident to the grouping of specialists. The internist is the natural choice for integrator and there is no reason why any group should not have more than one internist associated in this capacity.

In the study of an obscure case the group has the advantage in being able to give a more rapid and more complete overhauling of the patient. Nevertheless a large percentage of patients do not want and do not require such a thorough examination. It would be as ridiculous to put a man with a cut finger through such a process and expect him to pay for it as to expect the automobile owner to have his entire machine overhauled each time he has a puncture.

Let us not overdo this thing.

*The General Diagnostic Study of the Internist. L. F. Barker, M. D., Baltimore. New York Med. Jour. Vol. 108 Nos. 12, 13, 14.

THE AMERICAN BOARD FOR OPHTHALMIC EXAMINATIONS

The tendency of the profession to require more thorough scientific attainments from those who aspire to become specialists in various departments, is well illustrated by the action of the American Board for Ophthalmic Examinations, and is a move that might well be copied by representatives of the other specialties.

Beginning in 1913 the American Opthalmological Society, the Section on Ophthalmology of the American Medical Association and the American Academy of Ophthalmology and Oto-Laryngology, all appointed committees to work together toward raising the standards of their specialty. After several years of work, the American Board for Ophthalmic Examinations was organized, consisting of nine members, three from each of the above mentioned societies.

The functions of the board are: first, to establish standards of fitness to practice ophthalmology; second, to investigate and prepare lists of medical schools, hospitals and private instructors, recognized as competent to give the required instruction in ophthalmology; third, to arrange, control and supervise examinations to test the preparation of these who desire to practice ophthalmology and to confer a certificate upon those who meet the standards established.

In the future the American Ophthalmological Society and the American Academy of Opthalmology and Oto-Laryngology will require all applicants for membership to have the certificate or its equivalent in a degree in ophthalmology from a recognized university.

The American College of Surgeons has appointed the examiners of this board as their ophthalmic credentials committee.

The board will take into consideration the professional records and years of service of applicants in their examination. These examinations will be held annually at or near the time and place of meeting of the American Medical Association. Dr. W. H. Wilder, 122 South Michigan Ave., Chicago, Illinois, is the secretary. H. L. T.

THE RETURN OF INFLUENZA

While the return of influenza was variously predicted many did not consider that the country would be afflicted to any great degree. This was argued on the ground that in contrast to the epidemic of 1889 and the early nineties such a large percentage of the population was involved in the later epidemic that all non-immunes were affected and rendered immune.

About the middle of January the reappearance of influenza began to be widely reported throughout the country. The infection, whether one prefers the English or French term, was not as widespread nor as severe as that of a year ago. Clinically there was not the accompanying initial prostration and apparently the incidence of pneumonia was not as great. A certain percentage of individuals were reafflicted this year showing either a short lived immunity or a mixed infection as the etiological factor.

Apparently the influenza epidemic which had its height in the fall of 1918 must be viewed retrospectively as of several years' duration. It would not be unreasonable to expect more than an average number of cases next year.

There are just two main bits of advice the profession can offer regarding the treatment of this infection. The first bit is expressed in the dictum "Early to bed, early to rise." The second is the advisability but not guaranteed efficacy of prophylactic vaccination.

VITAL STATISTICS FOR 1918

Unreliable as statistics as a rule are, the recent report of the United States Census Bureau for the year 1918 is of considerable interest. This Bureau's registration area includes thirty states and twenty-seven cities outside this territory and comprises 77.8 per cent of the estimated population of the United States.

Roughly speaking, the bureau has recorded nearly a million and a half deaths in the year. About half a million of these were due to influenza and pneumonias of various types, the majority occurring during the last four months of the year. It seems remarkable that the cause of death in more than half of these cases were reported as simply influenza. This one fact shows an inaccuracy in diagnosis, as the

vast majority of cases reported dying from influenza certainly suffered also from pneumonia.

Next in importance in mortality come in the order mentioned, organic diseases of the heart, tuberculosis in all forms, the various nephritides, and cancer.

It is discouraging to note that there has been a slight increase in the number of fatalities due to tuberculosis during 1917 and 1918. Previous to this a gradual decrease had occurred since the year 1904. Tragic conditions following the World War will doubtless cause a marked increase in the prevalence of this disease so dependent on nutritional conditions. We, as a nation, are likely to share this unfortunate war penalty to at least a slight degree.

While cancer showed a slight decrease for 1918 this disease has shown a definite rise in incidence during recent years.

The remarkable decrease in the typhoid fever mortality rate from 35.9 in 1917 to 12.5 in 1918 is striking. Vaccination particularly and general improvement of hygienic conditions are probably responsible.

The automobile proved itself an expensive addition to modern life in exacting a toll of 7,525 lives. Street cars were responsible for 2,366, mines 2,497 and 5,633 individuals were drowned. The figure 9,937 for suicides was the lowest since 1903.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNEAPOLIS CLINIC WEEK

Minneapolis Clinic Week begins this year Monday, April 19th, and the program will be concluded Thursday, April 22nd.

This will be the third congress of this kind held by the Hennepin County Society. The first meeting was successful far beyond expectation. The second meeting was even more successful and it is hoped that the coming Clinic Week may eclipse the others in attendance and benefit to those present.

The program will vary somewhat from last year, clinics being given each day until 3 in the afternoon and from 4 to 6 o'clock clinical demonstrations, motion pictures and lantern talks will be presented at the Radisson Hotel.

Prospective visitors should make hotel reservations early through Dr. G. Elmer Strout, 900 Donaldson Bldg., Minneapolis.

It is planned to hold the annual banquet of the Hennepin County Society on one of the evenings of the week. Visitors are invited to be present at the banquet.

Officers of the clinical section are: Dr. A. W. Abbott, chairman; Dr. W. A. Jones, Dr. J. P. Schneider, Dr. R. E. Farr. Dr. G. Elmer Strout, secretary.

AMERICAN MEDICAL ASSOCIATION

The next meeting of this association will occur April 26 to 30, 1920, at New Orleans. Dr. H. W. E. Walther, 1216 Maison Blanche Bldg., New Orleans, chairman of the sub-committee on Transportation of the local committee on arrangements for the New Orleans session is ready to assist interested local medical organizations in cities located in the Mississippi Valley in the chartering of boats for the trip to New Orleans.

AMERICAN BOARD FOR OPTHALMIC EXAMINATIONS

The next examination by the Board will be held at New Orleans, Monday, April 26, 1920, at the time of the meeting of the American Medical Association. Candidates who wish to take the examination for the certificate of the board should make their application and send in the necessary credentials to Dr. W. H. Wilder, 25 East Washington street, Chicago, at once.

Conference on Public Health and Legislation

The midwinter conference on Public Health and Legislation will be held in Chicago, at Auditorium Hotel, March 4, 1920.

PROGRAM

Morning

Chairman's Address, Dr. Victor C. Vaughan.

Secretary's Report, Dr. Frederick R. Green.

"Standardization of Public Health Activities," Dr. George E. Vincent.

"Standardization of State Public Health Organizations", Dr. Chas. V. Chapin.

"Standardization of Municipal Health Organization," Dr. Allen McLaughlin.

Afternoon

"Health Education in the Public Schools—Thirty Years' Experience in Michigan," Dr. Victor C. Vaughan.

"Health Education and Activities in Colleges and Universities," Dr. J. Sundwall.

"Health Education a Function of Municipal Health Departments," Dr. H. Emerson.

"Health Education a Function of State Health Departments," Dr. W. S. Rankin.

"Health Education a Function of the Federal Government," Dr. Chas. V. Bolduan.

UPPER MISSISSIPPI MEDICAL SOCIETY

The meeting of the Upper Mississippi Medical Society was held at Brainerd, Minnesota, Jan. 6th, 1920. The following officers were elected: President, Dr.

J. A. Evert, Brainerd; first vice-president, Dr. F. L. Wilcox, Walker; secretary-treasurer, Dr. Irving Badeaux, Brainerd; censor, Dr. Knickerbocker, Staples; delegate to state association meeting, Dr. P. M. Hall, Walker; alternate, Dr. J. J. McKinnon, Wadena.

PARK REGION DISTRICT

The annual meeting of the Park Region District and the Otter Tail County Medical Association was held in January at Fergus Falls, Minnesota. The following officers were elected for the ensuing year. President, Dr. K. G. Lee, Underwood; vice-president, Dr. Randall, Ashby; second vice-president, Dr. Chas. W. Meckstroth, Brandon; secretary-treasurer, Dr. F. Naegeli.

SANITARIUM BOARD

The board of directors of the Tri-County sanatorium held their first annual meeting in January at Thief River Falls. The following officers were elected: President, Dr. O. F. Melby, Thief River Falls; secretary, P. O. Myhrum, Thief River Falls. Miss Karen Knutson was retained as superintendent of the hospital and Dr. M. G. Milan appointed regular physician.

WINONA COUNTY MEDICAL SOCIETY

The Winona County Medical Society at its annual meeting held Jan. 6, 1920 elected the following officers: President, Dr. C. A. Lester; vice-president, Dr. Samuel Schaefe; secretary, Dr. C. P. Robbins; treasurer, Dr. I. W. Steiner; delegate to state convention, Dr. B. P. Rosenberry; alternate, Dr. Donald B. Pritchard; member board of censors, Dr. G. J. Tweedy.

HENNEPIN COUNTY MEDICAL SOCIETY

The annual meeting of the Hennepin County Medical Society was held in the Donaldson Bldg., Minneapolis, Jan. 5, 1920. Dr. J. Frank Corbett was elected president; Dr. Angus Morrison, first vice-president; Dr. F. L. Adair, second vice-president and Dr. C. W. Petit was reelected secretary and treasurer for the coming three years. Dr. J. C. Litzenberg, the retiring president, gave an address on health insurance.

MEDICAL EDUCATION AND LICENSURE

The annual Congress of Medical Education and Licensure meets March 1, 2 and 3, 1920, at the Congress Hotel, Chicago, and is a combined meeting of the Council on Medical Education, Association of American Medical Colleges and the Federation of State Medical Boards.

PROGRAM

MONDAY, MARCH 1, 1920

MORNING SESSION, 9:30 A. M.

Introductory remarks by Dr. Arthur Dean Bevan, chairman of the Council on Medical Education, Chicago.

Dr. George Blumer, president of the Association of American Medical Colleges, New Haven, Conn.

Dr. David A. Strickler, president of the Federation of State Medical Boards, Denver, Colo.

"Present Status of Medical Education," Dr. N. P. Colwell, Chicago.

Symposium on "The Needs and Future of Medical Education," Dr. George E. Vincent, New York City.

Dr. Ray Lyman Wilbur, Stanford University, Calif.

Dr. Henry S. Pritchett, New York City.

Dr. Harry Pratt Judson, Chicago.

Mr. Abraham Flexner, New York City.

MONDAY AFTERNOON, 2 P. M.

"The Larger Function of State University Medical Schools," Dr. Walter A. Jessup, Iowa City.

"Full-Time Teachers in Clinical Departments," Dr. William Darrach, New York City.

"Research in Medical Schools, Laboratory Departments," Dr. Oskar Klotz, Pittsburgh.

"Research in Medical Schools, Clinical Departments," Dr. G. Canby Robinson, St. Louis.

TUESDAY, MARCH 2, 1920

MORNING SESSION, 9:30 A. M.

"Graduate Medical Instruction in the United States," Dr. Louis B. Wilson, Rochester, Minn.

"Interallied Medical Relations; Qualifying Examinations, Licensure, Examinations, Graduate Medical Instruction," Dr. Walter L. Bierring, Des Moines.

"Essential Improvements in State Medical Licensure," Dr. John M. Baldy, Philadelphia.

"Interstate Relations in Medical Licensure," Francis W. Shepardson, Springfield.

TUESDAY AFTERNOON, 2 P. M.

Reports on Medical Teaching from the Committee on Medical Pedagogy of the Association of American Medical Colleges.

Remarks by the chairman, Dr. W. S. Carter, dean, University of Texas Department of Medicine, Galveston.

Anatomy: Dr. Charles R. Bardeen, dean, Madison.

Histology and Embryology: Dr. F. C. Waite, Cleveland.

Physiology: Dr. E. P. Lyon, dean, Minneapolis.

Biological Chemistry: Dr. Otto Folin, Boston.

WEDNESDAY, MARCH 3, 1920

MORNING SESSION, 9:30 A. M.

Pharmacology: Dr. C. W. Edmunds, Ann Arbor.

Pathology: Dr. James Ewing, New York City.

Bacteriology and Parasitology: Dr. A. I. Kendall, Chicago.

Public Health and Preventive Medicine: Dr. Victor C. Vaughan, Ann Arbor.

WEDNESDAY AFTERNOON, 2 P. M.

Separate business meetings will be held by the Association of American Medical Colleges and the Federation of State Medical Boards. The former will meet in the Florentine Room and the latter in the Green Room.

OF GENERAL INTEREST

Dr. McAdory of New York has moved to Bemidji.

Dr. T. Thorson of Buffalo has taken a trip to Norway.

Dr. C. C. Blakely of Charles City, Iowa has located at Barnum.

Dr. R. M. Laney of Turtle River has located at Deer River.

Dr. W. V. Lindsay of Winona has been elected county physician.

Dr. Harold L. Lamb of Sauk Center has received his discharge from army service.

Dr. P. A. Lommen has located in Austin and associated himself with Drs. Hegge and Hegge.

Dr. B. A. Kamp has been discharged from army service and has again located in Albert Lea.

Dr. W. R. Humphrey of Stillwater has returned from Virginia after an absence of three months.

Dr. S. S. Shannon of Crosby has been appointed surgeon for the Northern Pacific railroad for the Cuyuna range.

Dr. D. W. Lynch announces his return from overseas service and the reopening of his diabetic sanatorium at West Bend, Wis.

Dr. H. J. Shelver of Appleton has moved to Ortonville where he will become associated with Drs. Bolsta, Karn and O'Donnell.

Dr. Harry Lowell, formerly associated with the Mayo clinic at Rochester, has been named head of the Mercy Hospital at Hamilton, Ohio.

Dr. C. D. Kolset of Benson has been appointed assistant surgeon and medical examiner for the United States Public Health service.

Dr. Joseph Neal, acting superintendent of the Minneapolis City Hospital, has resigned from the hospital staff to take up private medical practice.

Dr. John S. Abbott, St. Paul, has been appointed Deputy Health Officer to replace Dr. R. I. Hubert, who has resigned and moved to Bellflower, California.

Dr. Willard S. Howard, who was recently discharged from service has located in Dawson and will be associated with Drs. Stemsrud, Johnson and Johnson.

Dr. Harry L. Schurmeier formerly of St. Paul announces his return from Europe and resumption of the practice of medicine and surgery at Santa Barbara, Cal.

Dr. Nellie Barsness has returned from Europe, where she served as eye specialist in the Gas Hospital in the French Army, and has resumed her practice at 710 Lowry Bldg., St. Paul.

Dr. Edward Schons is equipping offices at 348 Lowry Bldg., St. Paul, for x-ray diagnosis and treatment. Following his discharge from the service, Dr. Schons studied with Dr. H. K. Pancoast of Philadelphia.

It should be of interest to physicians throughout the state to know that Dr. R. E. Farr of Minneapolis is giving local anaesthesia clinics on the second and fourth Saturdays each month at St. Mary's Hospital, Minneapolis. These clinics begin at 9 a. m and consist of clinical demonstrations and short lectures on various phases of local anaesthesia. An invitation is extended to interested physicians.

The Rockefeller Foundation has furnished four more fellowships for foreign physicians studying in America. These young men are from Czecho-Slavakia and are studying public health administration. This foundation already has eight Chinese physicians, eleven Chinese undergraduate medical students, four Chinese nurses, eleven medical missionaries on furlough from China, four physicians from Brazil and one from San Salvador, studying in America under fellowship.

The Public Health Service has undertaken an extension study of child hygiene in several localities in Missouri in connection with the newly created department of child hygiene in that state. This service will attempt to demonstrate what proper care of teeth and eyes and corrective measures for those mentally backward can do for the general development of the next generation. Glasses will be fitted, teeth looked after and suggestions made regarding the needs of the school children. Children of preschool age will be visited in the home and the work will include birth registration and even prenatal care.

Major R. R. Luce has recently assumed his duties as Supervising Dental Surgeon for the district including Minnesota, North and South Dakota and Montana with headquarters at 1242 Lowry Bldg., St. Paul. According to the recent policy adopted at Washington ex-dental surgeons with at least three years of professional experience since graduation are being appointed in each county of the United States. These men will care for ex-soldiers who are entitled to dental care on a fee basis. In the larger cities dental clinics will be established. The only one at present is under Dr. Robb in the Lowry Bldg., St. Paul. The regulations require that an ex-soldier must first have a compensation number, that is must have filled out Form 526 and been given a number before he is entitled to authority which will be given in this district on communicating with Major Luce.

The federal income tax for the year 1919 is due March 15, 1920 and payable to the nearest located Collector of Internal Revenue. All those having an income over $1000 are required to make a return. For married men the first $2000 of the net income and for single men the first $1000 are exempt. For each child dependent $200 exemption is allowed.

In estimating net income a physician is entitled to subtract from his gross income all professional expense such as office rent, stenographer's salary,

cost of drugs and subscriptions to medical societies and journals, donations to organized charities or religious activities and contributions to educational and scientific projects. Interest on any indebtedness and taxes except those on income or excess profits are also to be deducted. A fair percentage of automobile expense and depreciation may be charged off. This percentage should be estimated on the mileage used for purely professional calls.

The so-called normal tax is 4 per cent on the first $4000 of net income above the exemption. Above this $4000 the normal tax is 8 per cent. In addition there is a surtax when the net income exceeds $5000. This is a varying rate which is 1 per cent on any net income in excess of $5000 up to $6000 and this surtax increases 1 per cent on each $2000 in excess of $6000 up to the figure $100,000.

Any physician in the state desiring the privilege of prescribing or personally using distilled spirits (alcohol, whisky, gin and wines) should write the Prohibition Director, Minneapolis, Minn., asking for application forms. One form is required in order to prescribe for patients and a second form so specifying in order to have it on hand in practice.

The physician will receive a pad of prescription blanks which are to be used in prescribing alcohol in any form. The prescription shows the physician's number in addition to the ordinary prescription make up. The amount of liquor is limited to one pint for each patient during a period of ten days. In an emergency an ordinary prescription form may be used, but the physician's permit number and the patient's name, address, etc., must be included. The filled out application for permission to use alcohol in office practice for disinfection or in emergency cases must be sent to Washington where it will be acted upon by the Federal Prohibition Commissioner. The amount so procured is limited to six quarts a year and cannot be sold. Sale of distilled spirits is limited to druggists.

Provision has been made for druggists to obtain distilled spirits using a special form. They pay the non-beverage tax of $2.20 per proof gallon which rate is determined on the actual alcoholic content. The high prices often charged by dispensing druggists on the assumption that the beverage tax of over six dollars a gallon was paid by them are therefore exorbitant.

VIENNA RELIEF

We have the authoritive statement of Herbert Hoover that "The condition in Austria is the worst in all Europe." It is authoritatively reported that 150,000 human beings died in Vienna in 1919. American war workers state that ninety per cent of the children in Vienna have rickets and that tuberculosis, always with a high mortality rate there, is mounting to still higher levels. A special cable dated December 24th in the Chicago Tribune stated that the food and fuel supply of Vienna would be exhausted by Jan. 21st unless relief appeared. Newspaper reports have been confirmed by private communications.

The medical world, particularly that of the United States, owes a debt to Vienna. During the five years preceding the war three thousand five hundred American physicians studied in Vienna. It is true they paid a fee, but the fee was nominal considering what was received.

Dr. Carl Beck of Chicago has been in communication with Prof. Lorenz and Prof. Eiselsberg of Vienna as secretary of the Vienna Relief Committee with headquarters at 1826 Conway Bldg., Chicago, Ill. Chicago is trying to raise $500,000, Milwaukee has pledged to raise $100,000, St. Louis at least $100,000 and a large number of cities are following suit. Mr. Hoover's committee estimates *three million dollars* will be necessary.

This notice appears in order to enable members of the profession to contribute through reliable channels to this urgent call to save human lives from starvation.

Many physicians throughout the state have acquaintances, others have friends who may be suffering in Vienna. In spite of the pressing demands at home are there any quite as important as this elementary plea for food?

NEW AND MORE LIBERAL BENEFITS FOR EX-SERVICE MEN
EFFECTIVE DECEMBER 24, 1919

Under the new Amendment to the War Risk Insurance Act, which has been passed by Congress and which became a law on December 24, 1919, when it was signed by the President, war term insurance or United States Government life (converted) insurance policies may be made payable to any of the following list of beneficiaries:

Parent, grandparent, stepparent, parent through adoption, wife or husband, child, grandchild, stepchild, adopted child, brother, sister, half-brother, half-sister, brother through adoption, sister through adoption, stepbrother, stepsister, uncle, aunt, nephew, niece, brother-in-law, sister-in-law, a person who has stood in the relation of a parent to the insured for a period of one year or more prior to the insured's enlistment or induction, the children of such person; parent, grandparent, stepparent or parent through adoption of the insured's wife or husband.

United States Government life (converted) insurance may now be paid at death in a lump sum or in installments for 36 months or more, at the option of the insured.

The rate of compensation for disability has been greatly increased. A comparison between the amounts formerly granted under the War Risk Insurance Act with those provided by the new law follows:

Temporary Total Disability	W.R.I.Act	As Amended
With neither wife nor child....	$30	$ 80
With wife but no child.....	$45	$ 90
With wife and one child.....	$55	$ 95

With wife and two children....	$65	$100
With wife and three or more children	$75	$100
With no wife but one child....	$40	$ 90
With no wife but two children.	$50	$ 95
With no wife but three children	$60	$100
*With no wife but four children	$60	$105
Extra allowance for dependent mother or dependent father or both	$10 each	$ 10 each

*Under the new law there is an allowance to a man temporarily totally disabled, and with no wife living, of $5 additional for each child (in excess of one) without limit as to number.

NEW AND NON-OFFICIAL REMEDIES

During January the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion with New and Nonofficial Remedies:

Gilliland Laboratories:

Pasteur Anti-Rabic Vaccine-Gilliland.

Pneumococcus Vaccine Immunizing-Gilliland.

Eli Lilly and Company:

Chloroxyl.

Parmele Pharmacal Company:

Chinosol and Chinosol Tablets.

E. R. Squibb and Sons:

Thromboplastin Hypodermic-Squibb.

Winthrop Chemical Company, Inc.:

Veronal-Sodium.

Ichthyol.—An aqueous solution, the important medicinal constituents of which are ammonium compounds containing sulphur in the form of sulphonates, sulphones and sulphides. These products result from the sulphonation of the tarlike distillate obtained from the bituminous shales found near Seefeld in the Tyrol. Ichthyol is weakly antiseptic and mildly irritant. It is used locally on the supposition that it will secure the absorption of swellings and effusions in contusions, burns, etc., and especially in gynecologic practice and in various skin diseases. Ichthyol has been tried internally in a great variety of conditions, but its therapeutic value in many of its suggested applications has not been fully established. Merck and Co., New York (Jour. A. M. A., Jan. 3, 1920, p. 30.)

Veronal-Sodium.—A brand of barbital sodium complying with the N. N. R. standards. For a discussion of the actions and uses of barbital sodium, see New and Nonofficial Remedies, 1919, p. 83. The Winthrop Chemical Company, Inc., New York.

Procaine-Calco.—A brand of procaine complying with the N. N. R. standards. For a discussion of the actions and uses of procaine, see New and Nonofficial Remedies, 1919, p. 30. The Calco Chemical Company, Boundbrook, N. J.

Typhoid-Paratyphoid Bacterin (Special Bacterial Vaccine No. 13.)—Marketed in 5 Cc. vials, each cubic centimeter containing 1,000 million killed B. **typhosus**, 750 million killed **B. paratyphosus** "A" and 750 million killed **B. paratyphosus** "B". For a discussion of typhoid vaccine, see New and Nonofficial Remedies, 1919, p. 292. E. R. Squibb and Sons, New York (Jour. A. N. A., Jan. 3, 1920, p. 31.)

Mercurochrome-220.—A preliminary report of the Council on Pharmacy and Chemistry discusses the experimental status of this new germicide for use in the genito-urinary tract. While the lack of confirmatory evidence of its value does not permit more than a tentative acceptance, the available data may be sufficient to warrant its use by physicians, provided its experimental therapeutic status is recognized. Mercurochrome-220 (marketed by Hynson, Westcott and Dunning, Baltimore) is stated to be dibromo-oxymercury fluorescein. It is a red powder, insoluble in water but soluble in alkalis. According to Young, White and Swartz. Mercurochrome-220 is a strong and rapidly acting germicide which penetrates the tissues readily and is tolerated in 1 per cent solutions by the bladder, renal pelvis and urethra. Only temporary discomfort is caused when a 2.5 per cent solution is applied to the anterior urethra. Its toxicity is high, but no systemic effects have been observed following its local application (Jour. A. M. A., Jan. 3, 1920, p. 31.)

Chinosol.—Oxyquinolin Sulphate.—Chinosol is a powerful, nontoxic antiseptic, somewhat stronger than mercuric chloride and considerably stronger than phenol. It is a feeble germicide, being weaker than phenol and much weaker than mercuric chloride. Chinosol is claimed to have marked analgesic power and to be an efficient deodorant. Chinosol is also marketed in the form of chinosol tablets 0.25 Gm. Parmele Pharmacal Company, New York.

Dubois' Iodoleine.—Iodized poppyseed oil. An iodine addition product of poppyseed oil. Dubois' Iodoleine may be used whenever iodides are indicated, its effects being more gradually exerted. It is supplied as Dubois' iodoleine capsules 0.25 Cc., equivalent to 0.1 Gm. iodine, Dubois' iodoleine injectable, containing 30 per cent iodine, and Dubois' iodoleine injectable ampules, equivalent to 0.3 Gm. iodine. David B. Levy, New York (Jour. A. M. A., Jan. 10, 1920, p. 104.)

Thyroxin.—4, 5, 6-trihydro- 4, 5, 6-triiodo-alpha-oxy-beta-indole proprionic acid. An active principle obtained from the thyroid gland. Thyroxin is used essentially for the same purposes as Dried Thyroids, U. S. P. It is indicated in some cases of diminishing or absent thyroid functioning, such as simple goiter, cretinism or myxedema.. Thyroxin is supplied only in the form of tablets for oral administration, containing, respectively, 0.2, 0.4, 0.8 and 2 Mg. of thyroxin. E. R. Squibb and Sons, New York.

Thromboplastin Hypodermic-Squibb.—A sterilized extract of cattle brain in physiological solution of sodium chloride. It complies with the description of thromboplastin-Squibb, but a longer time is required for the clotting of blood plasma. It is intended for hypodermic and intramuscular injection to increase

the coagulability of the blood. E. R. Squibb and Sons, New York (Jour. A. M. A., Jan. 10, 1920, p. 105.)

Names for Phenolphthalein.—The following is a partial list of names under which phenolphthalein and phenolphthalein preparations and combinations are or were advertised: Alophen, Cholelith, Pills, Elzernac, Ex Lax, Exurgine, Laxophen, Laxine, Laxirconfect, Laxothalen Tablets, Paraphthalein, Phenalein, Phenolax Wafers, Phenolphthalein Laxative, Probilin, Prunoids, Purgatol, Purgen Konfect, Purgella, Purglets, Purgo, Purgolade, Purgotin, Purgylum, Phuphen, Thalosen, Veracolate, Zam Zam. What a Babeldom would arise in medical practice if this business policy of manufacturers to present their products by coined names were encouraged by the patronage of physicians. Self-respecting manufacturers owe it to the progress of medical science to do away with such camouflage for revenue only and the medical profession owes recognition to these manufacturers by prescribing products by their scientific names (Jour. A. M. A., Jan. 3, 1920, p. 29).

"Antipneumococcic Oil" and Camphor in Pneumonia.—The Council on Pharmacy and Chemistry reports that "Antipneumococcic Oil" (a solution of camphor in oil, sold by Eimer and Amend, New York) is ineligible for New and Nonofficial Remedies because (1) the recommendations for its use in pneumonia are not warranted by the evidence; (2) the name is not descriptive of the composition, but therapeutically suggestive; and (3) the sale of a solution of camphor in oil under a name non-descriptive of its composition is unscientific and a hindrance to therapeutic progress (Jour. A. M. A., Jan. 3, 1920, p. 46.)

More Misbrandings.—George L. King, Kingfisher, Oklahoma, was prosecuted by the federal authorities because the therapeutic claims for "King's Kidney Remedy" were false and fraudulent. The United States Drug Manufacturing Company, Philadelphia, was prosecuted by the federal authorities because a number of its tablets were found not to contain the amount of drug claimed. The John H. Casey Medical Company, Hillyard, Washington, was prosecuted by the federal authorities because "Casey's Rheumatic Cure—The Great Montana Remedy" was sold under false claims of composition and of therapeutic properties. Joseph McManus, doing business under the name of Philadelphia Capsule Co., Philadelphia, was prosecuted by the federal authorities because some of the products sold were misbranded, or adulterated, or both (Jour. A. M. A., Jan. 10, 1920, p. 121.)

Singleton's Eye Ointment.—This is a British nostrum. The chemists of the British Medical Association in 1909 reported it to be principally a mixture of lard and Japan wax and purified cocoanut oil, with 4 per cent of beeswax and 7.4 per cent of red mercuric oxid. (Jour. A. M. A., Jan. 17, 1920, p. 193).

Kline's Nerve Restorative.—In 1915, the A. M. A. Chemical Laboratory reported, of this alleged epilepsy remedy, that essentially each 100 Cc. of the solution contained approximately 8.7 gm. ammonium bromid, 9.2 gm. potassium bromid and 8.0 gm sodium bromid. Calculated from the bromid deterination, each mealtime dose contained the equivalent of 17.2 grains of potassium bromid (Jour. A. M. A., Jan. 17, 1920, p. 193.)

Apothesine.—This is an efficient local anesthetic manufactured by Parke, Davis and Co. It belongs to the procain rather than to the cocain type, that is, while efficient for injection anesthesia, it is relatively inefficient when applied to mucous membranes. The Council on Pharmacy and Chemistry reports that exception was taken to certain claims of efficiency, safety, etc., and that it sent these objections to Parke, Davis and Co. The firm apparently was unwilling or unable to submit evidence for the claims that had been questioned, nor did it offer to modify the claims themselves. Apothesine is, therefore, ineligible for inclusion in New and Nonofficial Remedies. It will, however, be listed in the "Described But Not Accepted" Department of New and Nonofficial Remedies (Jour. A. M. A., Jan. 24, 1920, p. 265.)

Dial "Ciba".—This is a hypnotic sold by A. Klipstein and Co., Inc. Chemically, it is closely related to barbital (veronal). The Council on Pharmacy and Chemistry reports that it has not been accepted for New and Nonofficial Remedies because unwarranted claims are made for the product. As it might be made eligible for N. N. R. if the misleading therapeutic claims were eliminated, the Council directed that Dial "Ciba" be included with articles "Described But Not Accepted" so that physicians might be informed with regard to its character and properties (Jour. A. M. A., Jan. 24, 1920, p. 266.)

Vleminckx' Solution.—This solution, used by Dr. W. A. Pusey for verrucae, is a solution of oxysulphuret of calcium. It is in the National Formulary as Liquor Calcis Sulphuratae and is made by boiling together water, lime and sulphur (Jour. A. M. A., Jan. 24, 1920, p. 268.

Skeen's Stricture Cure.—For some years, a concern in Cincinnatti which has gone under the name "D. A. Skeen" and "The D. A. Skeen Co." has advertised a mail order treatment that was "guaranteed" to cure stricture or enlarged prostate. Now the postal authorities have denied the use of the U. S. mails to this concern and its manager, George B. Poole. The product was found to be essentially a solution of ferric chlorid in alcohol and water (Jour. A. M. A., Jan. 31, 1920, p. 340.)

Pneumo-Strep-Serum.—In an advertisement of Pneumo-Strep Serum, the Mulford Company, by going beyond our present knowledge, carries misleading inferences. If the "Pneumo-Strep-Serum" had the virtues with which the advertisement inferentially endows it, this product would have been accepted by the Council on Pharmacy and Chemistry for in-

clusion in New and Nonofficial Remedies. It has not been so accepted, although many other biologic products of the same manufacturer have been (Jour. A. M. A., Jan. 31, 1920, p. 342.)

OBITUARY

DR. E. S. SOUTHARD

A keen sense of loss was felt by many members of the profession at the news of the death last month of Dr. E. S. Southard of Boston. Dr. Southard delivered lectures before the Society of Neurology of New York and the Association of Mental Hygiene at the New York Academy of Medicine, February 1st and 2nd, and was smitten with pneumonia the following day.

Dr. Southard was an assistant professor of psychology at Harvard University and professor of neuropathology at the Harvard Medical School. He was very active in his chosen field of psychiatry. Since 1912 he had been director of the Boston Psychopathic Hospital and at the time of his death was a director of the Massachusetts Psychiatric Institution. He was an assistant editor of the Journal of Nervous and Mental Diseases, the Psychiatric Bulletin and the Journal of Clinical and Laboratory Medicine. Among his books were "Neurosyphilis" written in collaboration with Dr. H. V. Solomon; "Shell-Shock and Neuropsychiarty" and the "Weekly Research Papers," which were written in collaboration with Dr. H. E. Fernold. During the war he was a major in the Chemical Warfare Service and also chairman of the committee on Psychiatry and Neurology of the National Research Council.

Dr. Southard's particular hobby was chess, and he ranked among the foremost amateur players of the country. He was especially interested in the case of Harry N. Pillsbury, the former American champion chess player who in his later years lost his mind. The doctor made an examination and study of his brain in an attempt to throw light on the mooted question whether a genius for chess tends to deteriorate the mind.

In 1906 Dr. Southard married Dr. Mabel Fletcher Austin of Boston, a John Hopkins Medical School graduate and sister of Helen and H. W. Austin of St. Paul.

CORRESPONDENCE

PHARMACOPOEIAL CONVENTION, MAY 11, 1920

In harmony with the requirements of the By-Laws, attention of interested parties is called to the meeting of the Tenth Decennial Pharmacopoeial Convention of the United States, to be held beginning at 10:00 a. m., May 11, 1920, at the Willard Hotel, Washington, D. C. All incorporated bodies and other institutions entitled to membership in this Convention are entitled to at once apply to Dr. Noble P. Barnes, Arlington Hotel, Washington, D. C., for the necessary blanks for membership in the Convention.

Prior to the meeting of the Convention the Committee on Credentials will meet in Washington to consider all applications which are made. It is important, therefore, that all applications for membership should be in the hands of Dr. Barnes at least six weeks before the date of the meeting. It will be difficult to consider, properly, credentials which are delayed beyond that date and especially those which may be presented at the time of meeting.

Sincerely,

B. H. W. WILEY,
President, 9th Decennial Pharmacopoeial Convention of the United States.

PROGRESS IN MEDICINE AND SURGERY

AGE DISTRIBUTION AND AGE INCIDENCE IN 500 CASES OF CANCER OF THE UTERUS. Reuben Peterson, M.D., F.A.C.S., Ann Arbor, Mich.; (Surg. Gyn. and Obst. Vol. 29, No. 6.) says, "Interest in the age incidence of carcinoma of the uterus was aroused by a recent case of this disease observed in the Gynecologic Clinic of the University Hospital in a young married woman 21 years old. 500 cases of uterine carcinoma were selected which had had the diagnosis confirmed microscopically in the University of Michigan Pathological Laboratory by its director. The following headings have been chosen for either anatomical or microscopical reasons:

"1. Carcinoma of the uterus;
2. Carcinoma of the cervix;
3. Carcinoma of the fundus;
4. Squamous cell of carcinoma of the cervix;
5. Adenocarcinoma of the cervix."

Among his conclusions he notes,

"1. The maximum age distribution in 500 cases of cancer of the uterus is at the age period 40 to 45.

"2. The young female is not immune to cancer, since 7 of 500 cases, or 1.4 per cent, occurred between the ages of 20 and 25.

"3. From the analysis of this series and from the statistics of other writers it is fair to assume that from 10 to 15 per cent of uterine carcinoma is located in the fundus." GEORGE EARL.

FUNCTIONAL DIAGNOSIS OF POLYGLANDULAR DISEASE IN ACROMEGALY AND OTHER DISTURBANCES OF THE HYPOPHYSIS. Howard (Am. Jour. Med. Sc., Dec. 1919), briefly reports six cases of hypophyseal disease, three of acromegaly, two of dystrophia adiposogenitalis and one of sarcoma of the occipito-parietal lobe with flattening of the hypophysis due to greatly increased intracranial pressure.

Determination of the sugar tolerance is the most accurate method to estimate the activity of the internal secretion of the hypophysis, thyroid gland and pancreas. The pars intermedia of the hypophysis is

directly concerned in carbohydrate metabolism; hypertrophy of it causes polyuria and a diminished carbohydrate tolerance; hypoplasia or degeneration of it results in a high degree of sugar tolerance. Therefore, in early acromegaly, we would find decreased sugar tolerance (in two cases of acromegaly of author) and in the later stages of hypophyseal disease when the pars intermedia has been destroyed by pressure or invasion, we would expect increased sugar tolerance. The author applied the usual method of sugar tolerance determination to his cases. He describes other tests to determine the function of the adrenals, etc.

Csepai has called attention to the experiment, that if three drops of a 1 to 1000 solution of adrenalin be dropped into the eye, slight or moderate blanching of the conjunctival sac will appear in a few minutes and will persist for ten to twenty minutes. Exaggeration and prolongation of the reaction indicate a diminished function of the adrenal glands. According to Csepai, a positive reaction (prolonged blanching) was associated with an increased carbohydrate tolerance. This relationship did not hold in the author's series. He further calls attention to the subcutaneous adrenalin test. Csepai found an increase of 30 to 60 mm. in the systolic pressure in normal cases after a subcutaneous injection of 5 mg. of adrenalin. This increase was not observed in one case of acromegaly, in one case of dystrophia adiposogenitalis and in one case of myxoedema, in all of which the conjunctival reaction was prolonged. The author could not confirm these findings in his series.

Falta has shown that subcutaneous administration of adrenalin in normal individuals produces a distinct leucocytosis with an increase of the neutrophiles. According to Csepai this does not occur in hypophyseal cases and therefore any variation from the normal lucocytosis indicates disease of the ductless glands. This test was of no value to the author in his series. He further describes the conjunctival pituitrin test and the subcutaneous pituitrin test neither of which helped him in the study of his cases.

In his summary, the author states that the subcutaneous adrenalin test and both of the pituitrin tests are of no value in determining the functional activity of the hypophysis, but that the adrenalin conjunctical test may help to demonstrate a hypofunction of the chromaffin system. A decrease in sugar tolerance combined with other symptoms of pituitary disturbance is indicative of increased activity of the pars intermedia. Internal administration of the pituitary extract of the whole gland or of the anterior or posterior lobe exert no influence upon the symptomatology of the disease.

E. M. HAMMES.

AN OPERATION FOR PERMANENT CORRECTION OF WEAK FEET IN CHILDREN. By C. Ogilvy, 1919-1-343. Journal of Orthopedic Surgery. Children suffering from weak feet walk with an abnormal eversion. The usual correction is obtained by inverting the feet and keeping them in this position through the aid of metal arches or the thickening of the inner edge of the shoes, heel and toe.

Many cases, even after being treated in this manner for years, still have marked deformity. The author finds in these cases that the joint of the greatest deformity and relaxation is in the astragalonavicular joint.

This joint is a ball and socket joint upon which the fore foot pronates and when the toes are turned out, the strain is increased upon the ligament as well as upon the joint, as the head of the astragalus rotates down and inward.

The object of the operation is to overcome this special deformity of the astragalo-navicular joint and consists of an arthrodesis of the point with the foot held in over-corrected position by means of plaster for some weeks. He advocates the continuance of the shoe with inner edge thickened for some months after the plaster has been removed and does the operation only in children over eight years of age.

C. C. CHATTERTON.

SCAR-TISSUE TUMORS OCCURRING ON THE MUCOUS MEMBRANE OF THE LOWER LIP. Bloodgood (Surgery, Gynecology and Obstetrics, Vol. xxix, No. 4) states that we are all familiar with the ordinary keloid that may form in any scar, whether the wound heals by first intention or by granulation. We know that this keloid is observed more frequently in the colored race and in children of the white race, and is perhaps more frequent in females of the white race than in the males. Microscopically this keloid growth is composed largely of spindle cells and fibroblasts; very cellular areas are not conspicuous. It is covered with epidermis in which the papillary epithelial body is small, and there are no hair follicles or glands. The thin epidermal covering of the subepidermal scar rarely ulcerates unless subjected to trauma. Then a chronic ulcer developes which is very slow in healing. In cases of this kind the microscopic section shows a surface of cellular granulation tissue. Although theoretically one would expect the development of sarcoma in such an area, or carcinoma when there is an ulcer, the author has observed neither.

The scar tumor Bloodgood calls attention to is one that is frequently diagnosed clinically and often pathologically, recurrent carcinoma. This tumor occurs on the mucous membrane of the lower lip. The patients give a history of the removal of a small mucous membrane, or subepidermal tumor. The growth has been removed either with the knife or some caustic. Now, when an induration appears in the scar which has the feel of a recurrent carcinoma, there is a second operation, but the scar-tissue tumor always returns. Bloodgood's observations demonstrate that this is a keloid growth, and the best results are obtained when it is left alone.

In considering the scar-tissue tumors of the

mucus membrane of the lower lip, the following evidence is helpful. Primary carcinoma of the mucous membrane of the lower lip is rare. The position of the onset of carcinoma of the lower lip is usually at the muco-cutaneous border. When this local lesion is excised as a V-shaped piece of tissue and the wound closed the author has never observed the keloid or scar-tissue tumor appear. Several cases, with illustrations, are discussed by the author.

E. M. JONES.

EYE SYMPTOMS IN PSEUDOTUMOR CEREBRI: Report of an Additional observation. W. Lutz, Havana Cuba (Archieves of Neurology and Psychiatry, Nov. 1919, Vol. 2, No. 5.) reports a case of a woman suddenly taken ill without temperature or symtoms of an infective meningitis, but presenting all the symptoms of a brain tumor namely choked disc, headache, vertigo and vomiting, they remained severe for 14 days slowly improving toward recovery, so much so that at the end of four weeks the patient felt normal. But two years thereafter a unilateral deafness developed, followed one year later by unilateral loss of vestibular function and intermittent periods of alternations in the left cerebello pontine angle. There was no unilateral Romberg sign. Pseudo-tumor can be diagnosed only by necropsy. The author states that he does not believe it to be a case of benign tumor of the cerebellopontino angle but that of a pseudo-tumor, for the following reasons. Sudden onset of disease, retrocession of symptoms within a short time, clearing up of the choked disc, negative reaction of the cerebrospinal fluid with increase of its quantity, the unilateral deafness did not appear as a first symptom, absence of progressive paralysis of other cranial nerves, increase in patients weight and the length of time elapsed since first attack.

GEORGE C. DITTMAN.

THE TRANSPLANTATION OF THE RECTUS MUSCLE OR ITS SHEATH FOR THE CURE OF INGUINAL HERNIA WHEN THE CONJOINED TENDON IS OBLITERATED. THE TRANSPLANTATION OF THE SARTORIUS MUSCLE FOR THE CURE OF RECURRENT HERNIA WHEN POUPART'S LIGAMENT HAS BEEN DESTROYED: Joseph Colt Bloodgood, M. D., (Annals of Surgery, Vol. LXX. No. 1, July, 1919.) says that the chief cause of recurrence in the lower angle of the wound was due to the fact that, whether the hernia was direct or indirect—the conjoined tendon was either weak or obliterated, and that the ordinary suture or closure of the defect in the abdominal wall was not sufficiently strong to protect from recurrence in the lower angle.

During the recent war he had an opportunity to examine in Maryland a large number of selected service men who were placed in Group B because of inguinal hernia. The conjoined tendon was obliterated in 5 per cent. As the majority of these selective service men volunteered to be cured of their defect in order to render service, he had an opportunity in a few months to operate on more than one hundred cases.

In this type of hernia, when one invaginates the scrotum and introduces the finger into the external ring, little or no resistance is met and the finger passes over the public bone, and, as a rule, can be pushed into the space of Retzius behind the rectus muscle. When this anatomical defect is present on both sides the two fingers meet behind the recti.

The weakness in the abdominal wall is therefore bounded laterally by Poupart's ligament and the rectus muscle, and below by the pubic bone. The firm and perfect closure of this opening is hampered by the presence of the cord.

The author says, "When I first transplanted the rectus in order to suture it to Poupart's ligament and thus strengthen the defect in the lower angle of the wound due to the obliteration of the conjoined tendon, I also transplanted the cord and excised the veins as in the Halsted operation (Fig. 2). Since my publication in 1899 we discontinued to transplant the cord and rarely excised the veins, and when this rarer type of inguinal hernia presented itself, we continued the method of transplantation of the rectus, usually with Halsted's modification of transplantation of its sheath (Fig. 3), but we did not transplant the cord. As far as I am able to ascertain, in the group in which I had transplanted the cord (Fig. 2) there has been only one recurrence, but since the change in technic of leaving the cord undisturbed in the lower angle of the wound, I know of at least four recurrences in operations which I performed myself, and it seems strange that this made no impression."

In conclusion he makes a plea for change in the technic of the usual procedure, when there is every evidence that the chief weakness is in the lower angle of the inguinal canal due to the obliteration of the conjoined tendon, and not in the usual position, in the upper angle where the cord is situated, and through which the testicle descended.

GEORGE EARL.

TUBERCULIN IN DIAGNOSIS AND TREATMENT OF EYE DISEASES: E. Torok. (Arch. of Opthal., Vol. 48, p. 242.) Because there is tuberculosis somewhere in the body it does not follow that the eye condition is of the same origin. The demonstration of the tubercle bacillus is but rarely possible and the microscopic examination of excised diseased tissue is feasible only in some anterior affections. From a practical standpoint, the most important factors in making the diagnosis of a tuberculous affection of the eye are the clinical appearance of the eye and the tuberculin injections. Tuberculous affections are characterized by their chronic course, low inflammatory symptoms, and the appearance of small nodules (tubercles) in the affected tissues. The latter are of the greatest importance, their presence

being almost positive proof of a tuberculous affection.

To confirm the diagnosis the resort is made to tuberculin. The Calmette reaction is mentioned only to be condemned; the von Pirquet test has its limitations and when positive gives no clew to the location of the tuberculous focus in the body.

The subcutaneous test is the most reliable. For this Torok gives ½ mgm., 1 mgm. and 3 mgm. in children, and 1 mgm., 3 mgm. and 5 mgm. in adults. A local or general reaction simply means a focus exists somewhere in the body. The local reaction is the most important and is the one which indicates that the tuberculous focus is in the eye. In those cases in which a local and general reaction is observed, the diagnosis of tuberculosis cannot be positively established. In such cases in which all other causes can be excluded, it is justifiable to consider the eye condition as of probable tuberculous origin. Torok gives a resume of 100 cases diagnosed and treated as tuberculous eye affections.

One of the outstanding facts was the length of treatment necessary, in many cases lasting a number of years. Another point was that the cases, not responding to treatment generally, did not show a focal reaction.

This was particularly true of exudative choroiditis. Of eight such cases with no focal reaction, 5 had dental infection and all recovered under appropriate treatment. All of the periphlebitis retinae cases showed a focal reaction and all recovered under tuberculin therapy. In a number of cases of sclerities and sclerosing keratitis not responding to tuberculin treatment, improvement was obtained by subconjunctival injections of guaiacol cacodylate as recommended by Darier. It was thought worthwhile to further consider this agent and to investigate its healing qualities in stubborn tuberculous eye conditions. Tuberculin injections are commenced with a 1/10,000 mgm. dose and gradually increased, dependent on the condition and the reaction of the patient, to a maximum of 1 mgm. All general reactions are avoided. The frequency of the injections is regulated partly by the amount given and partly by the action of the tuberculin upon the patient, of necessity varying with the individual. As a general rule Torok gives two injections a week until 1/1000 mgm. is reached; once a week up to 1/100 mgm.; once in two weeks up to 1/10 mgm. and once a month up to 1 mgm. No hard and fast rules can be laid down as to the length of treatment being again dependent on the individual. It is a matter of years, however, and not months. After apparent cure it is well to give an injection every 3 or 4 months, for years. The following conclusions were reached:

We consider an eye condition tuberculous only when a positive focal reaction has been observed.

In cases where, for some reason or other a positive focal reaction cannot be obtained, but the patient shows a positive general and local reaction, and every other possible cause for the eye condition is, with reasonable certainty, excluded, we consider the case of probable tuberculous origin.

For diagnostic and therapeutic purposes, tuberculin should always be used in fresh solution, not over two weeks old.

For diagnosis in eye conditions, only the subcutaneous injection is of value. It can be used in children as well as in adults with practically no danger.

Tuberculin is a valuable remedy in ophthalmic therapeutics provided it is used in very small doses, in positive tuberculous eye affections, i.e. in eye affections where a positive focal reaction was obtained. Used under these conditions, there is no danger involved.

The treatment should be started with a very small dose—1/10,000 mgm., increasing it slowly to the maximum dose that the patient can tolerate, which in no case should exceed 1 mgm. During treatment all reaction should be avoided.

Duration of treatment should be long. Relapses being frequent in those cases where treatment has been discontinued after an apparent cure following treatment of less than eight months.

Best results have been obtained in those cases where treatment was continued for several years, and in which after the apparent cure, an injection of the maximum dose was given once every three or four months.

Tuberculin is of least value in chronic uveitis cases, with the exception of heterochromic cyclitis; while in the cases of scleritis and periphlebitis retinae the tuberculin treatment is most satisfactory.

Scleritis, deep and interstitial keratitis, and iridocyclitis are closely related to each other and have not a separate entity, but may change from one condition to the other, a clinical observation which is borne out by the pathologic findings of Treacher Collins.

Exudative choriditis cases are seldom of tuberculous origin, the source of infection often being the teeth.

CARL L. LARSEN.

CAUSES OF BLINDNESS IN EGYPT: A. F. Mac Callan (Amer. Jour. of Ophth., Vol. 2, No. 10, Oct. 1919.) during the year of 1918 examined, together with his co-workers nearly nine thousand patients who were blind in one eye and more than four thousand who were blind in both eyes. In the Egyptian Ophthalmic Hospitals where these examinations were carried on the definition for blindness is the inability to count fingers held at more than one metre.

The prevalence of blindness in this locality at different ages is not without interest. In the cases reported in which blindness of one eye obtained are proportioned as follows: under one year of age, one and one-half per cent; from one to five years, three and one-quarter per cent; from six to ten years, four

and one quarter per cent; from eleven to fifteen years, five and one-half per cent; from sixteen to twenty, six per cent; from twenty-one to forty years, forty and one-half per cent; over forty, thirty-eight and one-half per cent.

The inference to be drawn from the above statistics is that blindness increases progressively from birth onwards.

The causes for blindness in the reported cases were largely the result of conjunctivitis (73.39 per cent) ending in total corneal opacity, shrunken globe, secondary glaucoma and various other sequelae not specified in the statistics. Acute conjunctivitis was, in the large proportion of cases the exciting cause for trachoma, as is well known, is a chronic disease and of itself seldom produces blindness. Of the reported blind, 10.96 per cent became so through glaucoma and it may be further added that one and one-half per cent of all patients that seek treatment at the Egyptian Hospital for diseased eye conditions are blind from glaucoma.

PAUL D. BERRISFORD.

A REVIEW OF THE EFFECTS OF GUNSHOT WOUNDS OF THE HEAD: Frazier and Ingham (Arch. Neur. and Psych., Vol. 3 No. 1.) report observations made in a series of 200 cases of wounds of the head at U. S. A. General Hospital at Cape May, N. J. 163 of these patients had cranial defects, 13 had cranial fractures and 24 no evidence of cranial injury. The injuries were produced mostly by bullets and high explosive fragments. Among the early important general symptoms, were disturbance of consciousness, amnesia, delirum, confusion, choked disc, slow pulse, headache and vertigo. Out of 132 cases, 110 became unconscious immediately following the injury for a period of a few minutes to several weeks. Out of the remaining 22, who did not become unconscious, 15 exhibited permanent focal brain symptoms. In the group of cases (72) who were unconscious from a few minutes to 24 hours, concussion was probably the immediate cause of unconsciousness. In the remaining cases (38), where unconsciousness was prolonged, hemorrhage, oedema and infection were important additional factors. Amnesia of a retrograde type was present in practically all cases. Among the late general symptoms were impaired memory, indifference, depression, inability to concentrate, irritability, headaches. Complete recovery was frequent, in from three to nine months, where gross damage to the brain was absent. The main causes producing residual general cerebral symptoms were loss of cerebral tissue, injury to the brain, injury to the brain without destruction of tissue, cranial defects, scars, psychoneurcsis. Frequently focal symptoms disappeared completely within one or two months following the injury. In these cases, the injury was not sufficiently marked to produce brain tissue destruction. Twenty-four cases gave a history of hemiplegia, which later disappeared entirely. Of the 200 cases, sixty suffered permanent motor symptoms of cerebral origin. However, in most instances the paralysis improved decidedly and complete paralysis of a limb was never permanent.

The functions of motility most disturbed were those of highly specialized and intricate character. Thirty-eight patients had permanent impairment of some of the forms of sensibility. Only twenty-eight patients of the entire series had convulsions while in the hospital, three of which gave a history of epilepsy prior to the injury. Two patients died—one from a temporo-parietal abscess and the other one from internal hydrocephalus and pneumonia.

Patients with hemiplegia, etc., received daily massage, muscle training, electricity and exercises. The advisability of surgical interference in these cases is fully discussed. The authors prefer the use of a bone transplant to repair cranial defects. In their summary, they speak of conditions under which operation is not recommended:

1—For the repair of small defects.

2—For the repair of defects in which the brain is adequately protected by a dense cicatrization and there is no protrusion when the patient stoops.

3—For the treatment of cerebral hernia.

4—For the relief of epilepsy except under the conditions previously noted.

5—When there are any grounds for suspecting an abscess or when there are foreign bodies which may require removal.

Conditions under which operation is recommended:

1—For cosmetic reasons, especially when the defect is in the frontal region below the hair line. There are many of these.

2—In certain selected cases of epilepsy.

3—In the presence of a large defect where the brain is exposed to trauma.

4—When the patient is apprehensive, because of the defect and he dreads the possibility of a direct blow on the uncovered cortex.

5—In a few cases where the symptoms are wholly subjective, an operation is advisable in the hope that, combined with the influence of suggestion, the neurosis will be relieved.

E. M. HAMMES.

BACTERIOLOGY OF THROAT CARRIERS OF STREPTOCOCCUS HEMOLYTICUS: Henry J. Nichols, M. D. (An. of Ot., Rh. and Lar., June, 1919, Vol. 28, No. 2.) In the discussion of a subject so vast as this the prevention of epidemics must be entirely based upon the carrier problem. Some of these organisms found in carriers are pathogenic, others are saprophytic but until they are differentiated all must be considered dangerous.

The term streptococcus hemolyticus is not a specific biologic species but simply means a hemolyzing streptococci and for clinical purposes the term is synonymous with streptococcus pyogenes. The

property of hemolysis in streptococcus cases seems to be a metabolic activity having no clinical equivalent. A similar anemia occurs with pneumococcus infection.

For the detection of carriers the specimen of the flora of the throat is obtained by passing a sterile swab over the fauces and posterior wall of the pharynx. Crypts of the tonsils are the most frequent habitat of the hemolytic streptococus based upon the following. 1. Cultures from the surfaces of the tonsils are postive more frequently and more strongly than cultures from any other area of the nasopharynx. 2. Crypt cultures in vivo are positive in higher percentage of cases than surface cultures. 3. Crypt cultures of excised tonsils are positive in a high percentage. 4. Excision of the tonsil is the surest way of curing carriers.

In a series of fifty normal cases examined at the Walter Reed Hospital 28 per cent were positive with ordinary throat cultures and 50 positive by crypt culture.

The procedure for examination is, first, inoculation in blood agar with subculture of the original hemolysing colonies in plain broth for further identification by means of morphology and a second hemolysis test. This requires 48 hours. The streptoccus seem to form a similar group of organism according to the procedures of bacteriology. The difference in morphology is of small significance in differentiation; likewise is the degree of hemolysis. Virulence tests are made by injecting different quantities of broth culture in rabbits, mice or rats. The virulence can be raised by animal passage. (Note—No doubt the extreme virulence encountered in 1918 and 1919 was due to the passage of various strains from man to man.)

The end reaction of bovine and human strains have a sharply defined range in the hydrogen in concentration scale and the addition of an indicator such as methyl-red serves to distinguish the acid bovine strains from the less acid human strains. This disposes of one false lead supposing that recent epidemics of streptococcus infection came from milk, butter and cheese. Bovine types are of no clinical significance and milk is only dangerous when contaminated by human strains.

Measures for the control of streptococcus infection through the carrier point must depend on the result of bacteriologic studies.

George C. Dittman.

BOOK REVIEWS

BOOKS RECEIVED FOR REVIEW

Nervous and Mental Diseases. Church and Peterson. 9th edition. W. B. Saunders Co. $7.00.

Pathogenic Bacteria and Protozoa. McFarland. W. B. Saunders Co. $4.75.

Manual of Obstetrics. Hirst. W. B. Saunders Co. $3.00.

Manual of Obstetrics. Davis. W. B. Saunders Co. 2nd edition. $3.00.

Medical Clinics of North America. vol. 3, non. 2. Sept. 1919. W. B. Saunders Co.

Surgical Clincs of Chicago. Vol. 3, No. 6. Dec., 1919. W. B. Saunders Co.

Miscellaneous Nostrums. American Medical Association. 4th edition. 1919.

Bacteriology in Abstract. Wallgren. Medical Abstract Pub. Co.

Systemic Development of Xray Plates and Films. C. V. Mosby Co.

Practitioners Manual of Venereal Diseases. Magian. C. V. Mosby Co. $3.00.

Modern Surgery. DaCosta. W. B. Saunders Co. $8.00.

Syphilis. Hazen. C. V. Mosby Co. $6.00.

MANUAL OF OBSTETRICS. By J. C. Hirst, Associate in Obstetrics, University of Pennsylvania, W. B. Saunders & Co., 1919, $3.00.

MANUAL OF OBSTETRICS. By E. P. Davis, Professor of Obstetrics, Jefferson Medical College, W. B. Saunders & Co., 1919, $3.00.

The author of the first volume intends it as a companion book to his Manual of Gynaecology.

The second volume is the second edition of the work.

These two volumes, of similar size and binding, dealing with the same subject, written by two recognized American authorities, and published by the same publishing house, may be properly discussed jointly.

They are of 485 and 466 pages of reading matter and 216 and 163 illustrations respectively.

The subject of obstetrics from a practical and working standpoint is thoroughly and completely covered. The reader can find readily any subject he might wish, and in a few sentences or paragraphs get the desired information without having to devote any time to unprofitable discussion.

Completeness, brevity, and conciseness are characteristic of both books and Davis, in the second edition, has added much new material on the subjects of differential diagnosis of early pregnancy, treatment of eclampsia by sedatives, hydatidiform mole, caesarean section and other leading and important phases of the subject.

For a ready reference book for both student and busy practitioner both volumes can be highly recommended.

Albert G. Schulze, M.D.

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Gunderson, R. M.....Lake Park
Hagen, O. J.....Moorhead
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Regular meetings in March, June, September, and December
Annual meeting, third Thursday in December

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Biederman, Jacob—
Thief River Falls

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Dunlop, A. H.....Crookston
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Thief River Falls
Hodgson, H. H.....Crookston
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Holmes, W. B.....Ada
Just, A. A.....Crookston
Kahala, Arthur.....Crookston

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Kirsch, R. L.....Crookston
Kjelland, J. S.....Crookston
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Olson, O. H.....Erskine
Paulson, A. J....Thief River Falls
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Pope, Stevens, Traverse, and Big Stone Counties
Regular meetings, second Wednesday of January, April and July
Annual meeting, October

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Caine, C. E.....Morris

Christenson, C. R.....Morris
Eberlin, E. A.....Glenwood
Elsey, J. R.....Glenwood
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Whittemore, J. G.....Donnelly

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COUNCILOR, J. G. MILLSPAUGH, M. D. (3 years).....Little Falls

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Regular meetings, first Monday in each month
Annual meeting, first Monday in December

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Kelly, B. W.....Aitkin
Ratcliffe, J. J.....Aitkin

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Regular meetings, first Tuesday, January, April, July, October
Annual meeting first Tuesday in January

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Allen, F. H.....Staples
Badeaux, Geo. J.....Brainerd
Beach, Geo. Wm....Cacak, Serbia
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Christie, G. R.....Long Prairie
Collie, H. G.....Brainerd
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Watson, John D.....Holdingford
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Will, W. W.....Bertha
Williams, R. J.....Pine River
Wiltrout, I. G.....Rushford
Withrow, M.E...International Falls

THIRD DISTRICT

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Ramsey County Medical Society

Regular meetings, last Monday of each month except June, July and August
Annual meeting, last Monday in January

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Benepe, L. M.....St. Paul
Bennion, P. H.....St. Paul
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Cannon, Harry.....St. Paul
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Christison, J. T.....St. Paul
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Cole, Wallace .....St. Paul
Colvin, A. R.....St. Paul
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Cowern, E. W.....St. Paul
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Ferguson, J. C.....St. Paul
Fogarty, Chas. W.....St. Paul
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Hilger, L. A.....St. Paul
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Simon, Geo.. H.....St. Paul
Skinner, H. O.....St. Paul
Smith, Charles E. Jr.....St. Paul
Sneve, Haldor .....St. Paul
Sohlberg, Olaf .....St. Paul
Staley, J. C.....St. Paul
Steen, A. H.....Cottage Grove
Sterner, E. G.....St. Paul
Stevens, F. A.....Lake Elmo
Stierle, Adolph Jr.....St. Paul
Stinnette, S. E.....St. Paul
Stolpestad, H. L.....St. Paul
Sutton, L. F.....St. Paul
Sweeney, Arthur.....St. Paul
Taylor, H. L.....St. Paul
Teisberg, C. B.....St. Paul
Van Slyke, Chas. A.....St. Paul
Vercellini, G.....St. Paul
Von der Weyer, Wm.....St. Paul
Warner, E. F.....St. Paul
Welch, M. C.....St. Paul
Whitacre, J. C.....St. Paul
Whitcomb, Ed. H.....St. Paul
White, J. S.....St. Paul
Whitmore, F. W.....St. Paul
Whitney, A. W.....St. Paul
Williams, Clayton.....St. Paul
Winnick, J. B.....St. Paul
Wold, K. C.....St. Paul
Wood, Harry G.....St. Paul
Zimmerman, H. B.....St. Paul

Washington County Medical Society

Regular meetings, held bi-monthly on second Tuesday of odd numbered months
Annual meeting, November

President
Newman, G. A.....Stillwater
Secretary
Landeen, F. G.....Stillwater
Burfiend, G. H.....Afton
Clark, G. E.....Stillwater
Freligh, E. O'B.....Stillwater
Haines, J. H.....Stillwater
Humphrey, W. R.....Stillwater
Kalinoff, D.....Stillwater
Landeen, F. G.....Stillwater
Merrill, B. J.....Stillwater
Mingo, F. E.....Hugo
Newman, G. A.....Stillwater
Poirier, J. A.....Forest Lake
Thompson, V. C.—
Marine-on-St. Croix
Wells, E. E.....Stillwater

Chisago-Pine County Medical Society

Regular meetings, second Tuesdays of January and July
Annual meeting, second Tuesday of January

President
Murdock, H. G.....Taylors Falls
Secretary
Anderson, C. A.....Rush City
Anderson, C. A.....Rush City
Bohling, B. S.....Sandstone
Conner, W. H.....Finlayson
Dredge, H. P.....Sandstone
Gray, C. E.....Rush City
Gunz, A. N.....Center City
Magnusson, Herman V.—
North Branch
Murdock, H. G.....Taylors Falls
Stowe, A. J.....Rush City
Tilton, A. J.....Alden
Werner, O. S.....Lindstrom
Wiseman, R. L.....Pine City
Zeien, Thos.....North Branch

Central Minnesota District Medical Society

Regular meetings, January, April, July and October
Annual meeting, July

President
Cooney, H. C.....Princeton
Secretary
Parsons, Geo. E.....Elk River
Bacon, H. P.....Milaca
Clifton, Theo. A.....Isanti
Cooney, H. C.....Princeton
Frasier, Geo. W.....Hill City
Parsons, Geo. E.....Elk River
Rheim, J. E.....Mora
Shulean, Nellie .....Cambridge
Stocking, Fred F.....Milaca
Swenson, Chas. .....Braham
Vrooman, F. E.....St. Francis

St. Louis County Medical Society

Regular meetings, second Tuesday of each month
Annual meeting, October 14th, 1920

President
Rowe, O. W.....Duluth
Secretary
Shapiro, E. Z.....Duluth
Abbott, Wm. P.....Duluth
Adams, B. S.....Hibbing
Allaben, G. R.....Buhl
Arminen, K. V.....Duluth
Ayres, G. L.....Ely
Bagley, W. R.....Duluth
Barney, L. A.....Duluth
Berquist, K. E.....Duluth
Binet, H. E.....Grand Rapids
Blacklock, S. S.....Hibbing
Boyer, S. H.....Duluth
Braden, A. J.....Duluth
Bray, C. W.....Biwabik
Bullen, F. W.....Hibbing
Burns, H. J.....Duluth
Carstens, C. F.....Hibbing
Chapman, T. L.....Duluth
Cheney, E. L.....Duluth
Clark, F. F.....Duluth
Collins, A. N.....Duluth
Collins, H. C.....Duluth
Cosgrove, J. H.....Duluth
Coventry, Wm. A.....Duluth
Crowe, J. H.....Virginia
Doolittle, E. F.....Duluth
Drenning, F. C.....Duluth
Eklund, J. J.....Duluth
Eklund, Wm. J.....Duluth
Elias, F. J.—
Morgan Park Hospital, Duluth
Fahey, E. W.....Duluth
Farmer, J. C.....McKinley
Forbes, R. S.....Duluth
Gendron, J. F. X.....Grand Rapids
Gillespie, N. H.....Duluth
Graham, David.....Duluth
Graham, Robert.....Duluth
Grawn, F. A.....Duluth
Greeley, L. O.....Duluth
Haney, C. L.....Duluth
Heimark, O. E.....Duluth
Hirschboeck, F. J.....Duluth
Hirschfield, M. S.....Duluth
Horde, H. .....Duluth
Hulsman, L. J.....Marble
Hursch, M. M.....Grand Rapids
Jenson, L. J.....Duluth
Judson, W. F.....Duluth
Keisling, I. H.....Chisholm
Keyes, C. R.....Duluth
Klein, Harry .....Duluth
Kraft, Peter .....Duluth

Kuth, J. R.....Duluth
Laird, A. L. .....Nopeming
Lenont, C. B.....Virginia
Lindgren, E. I.....Duluth
Linneman, N. L.....Duluth
Lum, C. E.....Duluth
Lyman, Frank—
Riverside Hospital, Duluth
McComb, C. F.....Duluth
McCoy, Mary .....Duluth
McCuen, J. A.....Duluth
McDonald, A. L.....Duluth
McGiffert, E. N.....Duluth
McIntire, E. H.....Virginia
Magney, F. H.....Duluth
Malmgren, C. V.....Virginia
Manley, J. R..... .....Duluth

Martin, L. K.....Duluth
Merriman, L. L.....Duluth
Morsman, L. N.....Hibbing
Murray, D. D.....Duluth
Nicholson, M. A.....Duluth
Paradine, D. J.....Duluth
Pare, L. T.....Duluth
Payette, C. H.....Duluth
Pennie, D. F.....Duluth
Raadquist, C. S.....Hibbing
Reynolds, H. W.....Hibbing
Robinson, J. M.....Duluth
Rowe, O. W.....Duluth
Ryan, J. W...Morgan Park, Duluth
Schroeder, C. H.....Duluth
Schwartz, A. H.....Duluth

Seashore, D. E.....Duluth
Shapiro, E. Z.....Duluth
Smith, C. C.....Carson Lake
Spicer, F. W.....Duluth
St. Clair, G. G.....Duluth
Strathern, M. L.....Gilbert
Sukeforth, L. A.....Duluth
Sutherland, H. M.....Ely
Taylor, C. W.....Duluth
Tibbet, M. H.....Duluth
Tilderquist, D. L.....Duluth
Tuohy, E. L.....Duluth
Turnbull, F. M.....Duluth
Walker, A. E.....Duluth
Wilkinson, S.....Duluth
Winter, J. A.....Duluth

Carlton County Medical Society

President
Walters, F. R.....Moose Lake
Secretary
Raiter, F. U. S.....Cloquet

Brunet, L. M.....Cloquet
Felming, James .....Cloquet
Raiter, F. U. S.....Cloquet

Spurbeck, R. G.....Cloquet
Stewart, A. B.....Cloquet
Walters, F. R.....Moose Lake

FOURTH DISTRICT

COUNCILOR, R. J. HILL, (2 years).....Minneapolis

Hennepin County Medical Society

Regular meetings, first Monday of the month
Annual meeting, first Monday in January

President
Corbett, J. Frank.....Minneapolis
Secretary
Pettit, C. W.....Minneapolis

Abbott, A. W.....Minneapolis
Adair, F. L.....Minneapolis
Allen, H. W.....Minneapolis
Andersen, Arnt G.....Minneapolis
Anderson, A. E.....Minneapolis
Anderson, J. D.....Minneapolis
Arey, H. C.....Excelsior
Aurand, W. H.....Minneapolis
Avery, J. F.....Minneapolis
Baier, Florence C.....Minneapolis
Baker, H. A.....Minneapolis
Baldwin, L. B.....Minneapolis
Barron, Moses .....Minneapolis
Barton, Edgar R.....Minneapolis
Baxter, S. H.....Minneapolis
Bell, John W.....Minneapolis
Bell, J. Warren Jr.....Minneapolis
Benedict, E. E.....Minneapolis
Benjamin, A. E.....Minneapolis
Benn, F. G.....Minneapolis
Benson, Geo. E.....Minneapolis
Bessessen, A. W.....Minneapolis
Bishop, Chas. W.....Minneapolis
Bissell, F. S.....Minneapolis
Booth, A. E.....Minneapolis
Boreen, Clifton A.....Minneapolis
Boutelle, Louisa E.....Minneapolis
Bouman, H. A. H.....Minneapolis
Bracken, H. M.....Minneapolis
Bratrud, Arthur F.....Minneapolis
Brooks, Chas. Noyes...Minneapolis
Brown, E. D.....Minneapolis
Brown, Edward J.....Minneapolis
Brown, Paul F.....Minneapolis
Brown, R. S.....Minneapolis
Byrnes, W. J.....Minneapolis
Cabot, V. S.....Minneapolis
Camp, W. E.....Minneapolis
Campbell, Lowell M....Minneapolis
Campbell, Robt. A.....Minneapolis
Carlaw, C. M.....Minneapolis
Chapman, O. S.....Minneapolis
Cheleen, S. J.....Minneapolis
Chowning, Wm.....Minneapolis
Cirkler, A. A.....Minneapolis
Clark, Howard S.....Minneapolis
Cochrane, Wm. J.....Minneapolis
Condit, W. H.....Minneapolis
Corbett, J. Frank.....Minneapolis
Cosman, E. O.....Minneapolis
Craft, Leo M.....Minneapolis
Crume, Geo. P.....Minneapolis

Cutts, Geo.....Minneapolis
Deziel, G.....Minneapolis
Diesen, C. F.....Minneapolis
Donaldson, C. A.....Minneapolis
Doxey, G. L.....Minneapolis
Drake, C. R.....Minneapolis
Driesbach, N.....Minneapolis
Dunsmoor, F. A.....Minneapolis
Dutton, C. E.....Minneapolis
Egan, John M.....Minneapolis
Eggan, O. K.....Minneapolis
Eitel, G. G.....Minneapolis
Erb, F. A.....Minneapolis
Erdman, C. A.....Minneapolis
Ericson, J. G.....Minneapolis
Fansler, W. A.....Minneapolis
Farr, R. E.....Minneapolis
Feidt, W. W.....Minneapolis
Fjelstad, C. Alford.....Minneapolis
Fleming, A. S.....Minneapolis
Franzen, H. G.....Minneapolis
Gardner, E. L.....Minneapolis
Giessler, Paul W.....Minneapolis
Gordon, G. J.....Minneapolis
Greene, E. K.....Minneapolis
Guilford, H. M.....Minneapolis
Hacking, Frank H.....Minneapolis
Haggard, G. D.....Minneapolis
Hall, J. M.....Minneapolis
Hallowell, W. H.....Minneapolis
Hamel, C. E.....Minneapolis
Hamilton, A. G.....Minneapolis
Hanson, Erling .....Minneapolis
Hanson, Olga S.....Minneapolis
Hare, Earle R.....Minneapolis
Harrington, C. D.....Minneapolis
Hartzell, Thos. B.....Minneapolis
Haverfield, Addie R.....Minneapolis
Haynes, F. E.....Minneapolis
Head, Geo. D.....Minneapolis
Hedbach, A. E.....Minneapolis
Helk, H. H.....Minneapolis
Hendrickson, J. F.....Minneapolis
Higgins, J. H.....Minneapolis
Hill, Eleanor J.....Minneapolis
Hill, R. J.....Minneapolis
Hobbs, C. A.....Minneapolis
Howe, A. W.....Minneapolis
Huenekens, E. J. .....Minneapolis
Hynes, James.....Minneapolis
Hynes, John E. .....Minneapolis
Hvoslef, Jakob.....Minneapolis
Ikeda, Kano .....Minneapolis
Irvine, H. G.....Minneapolis
Jarvis, Bruse W.....Minneapolis
Jensen, M. J.....Minneapolis
Johnson, A. E.....Minneapolis

Johnson, James A.....Minneapolis
Johnson, Julius .....Minneapolis
Johnson, Nimrod .....Minneapolis
Johnson, R. A.....Minneapolis
Jones, G. M.....Minneapolis
Jones, H. W.....Minneapolis
Jones, R. N.....Minneapolis
Jones, W. A.....Minneapolis
Josewich, Alexander....Minneapolis
Kennedy, C. C.....Minneapolis
Kennedy, R. R.....Minneapolis
Kerrick, Stanley.....Minneapolis
Kimball, H. H.....Minneapolis
King, W. R.....Minneapolis
Kirmse, Geo. W.....Minneapolis
Kistler, C. M.....Minneapolis
Knight, H. L.....Minneapolis
Knight, R. T.....Minneapolis
Knight, Ray R.....Minneapolis
Koch, John Chas.....Minneapolis
Kohler, Geo. A.....Minneapolis
Koller, Herman M.....Minneapolis
Koller, L. R.....Minneapolis
Kremer, Walter J.....Minneapolis
Kriedt, Daniel.....Minneapolis
Lajoie, John M.....Minneapolis
LaPierre, C. A.....Minneapolis
Laurent, A. A.....Minneapolis
LaVake, R. T.....Minneapolis
Law, A. A.....Minneapolis
Leavitt, H. H.....Minneapolis
Lee, T. G.....Minneapolis
Leland, M. W.....Minneapolis
Lemstrom, Jarl .....Minneapolis
Lewis, J. D.....Minneapolis
Lind, C. J.....Minneapolis
Linner, H. P.....Minneapolis
Little, J. W.....Minneapolis
Litzenberg, J. C.....Minneapolis
Loomis, E. A.....Minneapolis
Lyng, John .....Minneapolis
Lyon, J. D.....Minneapolis
Lysne, Henry .....Minneapolis
McDonald, H. N.....Minneapolis
McEachran, A.....Minneapolis
McIntyre, George .....Minneapolis
MacDonald, D. A.....Minneapolis
Mac Donald Irving C...Minneapolis
Macnie, J. S.....Minneapolis
Maland, C. O.....Minneapolis
Mann, Arthur T.....Minneapolis
Marriette, Ernest—Glen Lake
Sanatarium, Hopkins, Minn.
Mark, D. B.....Minneapolis
May, W. H.....Minneapolis
Mead, Marion .....Minneapolis
Meyer, E. L.....Minneapolis

Moir, Wm. W.....Minneapolis
Monahan, J. A.....Minneapolis
Monahan, R. H.....Minneapolis
Moorhead, M. B.....Minneapolis
Moren, E.....Minneapolis
Morriss, Herbert A.....Minneapolis
Morrison, A. N.....Minneapolis
Murphy, I. J.....Minneapolis
Murray, W. R.....Minneapolis
Nelson, C. P.....Minneapolis
Nelson, H. S.....Minneapolis
Newhart, Horace .....Minneapolis
Nippert, L. A.....Minneapolis
Nissen, Henrick.....Minneapolis
Noonan, Dan F.....Minneapolis
Nordland, Martin .....Minneapolis
Nordley, H. R.....Minneapolis
Noth, H. W.....Minneapolis
O'Donnell, Jas. E.....Minneapolis
Oberg, C. M.....Minneapolis
Olson, F. A.....Minneapolis
Olson, G. M.....Minneapolis
Olson, Olaf A.....Minneapolis
Oppegaard, M. O.....Minneapolis
Owre, Oscar .....Minneapolis
Parker, E. H.....Minneapolis
Parks, Albert H.....Minneapolis
Patterson, W. E.....Minneapolis
Paulsen, E. L.....Minneapolis
Pederson, R. M.....Minneapolis
Peppard, T. A.....Minneapolis
Perry, Ralph St. J.....Minneapolis
Peterson, J. R.....Minneapolis
Peterson, Thorvald ....Minneapolis
Pettit, C. W.....Minneapolis
Pineo, W. B.....Minneapolis
Poehler, F. T.....Minneapolis
Poppe, F. H.....Minneapolis
Pratt, Fred J.....Minneapolis
Pratt, J. A.....Minneapolis
Preine, Irving A.....Minneapolis
Quimby, Thos. F.....Minneapolis
Quist, H. W.....Minneapolis
Reed, Chas. A.....Minneapolis
Rees, Soren P.....Minneapolis
Reynolds, J. S.....Minneapolis
Ringnell, C. J.....Minneapolis
Rishmiller, J. H.....Minneapolis
Rizer, R. I.....Minneapolis
Roan, Carl M.....Minneapolis
Robert, Thos. S.....Minneapolis
Roberts, W. B.....Minneapolis
Robertson, H. E.....Minneapolis
Robitschek, E. C.....Minneapolis
Rochford, W. E.....Minneapolis
Rodda, F. C.....Minneapolis
Rodgers, C. L.....Minneapolis
Rosen, S.....Minneapolis
Rowntree, L. G.....Minneapolis
Schefcik, J. F.....Minneapolis
Scheldrup, N. H.....Minneapolis
Schmitt, S. C.....Minneapolis
Schneider, J. P.....Minneapolis
Schultz, F. W.....Minneapolis
Schwyzer, G.....Minneapolis
Seashore, Gilbert.....Minneapolis
Sedgewick, J. P.....Minneapolis
Seham, Max .....Minneapolis
Simons, Jalmar.....Minneapolis
Simpson, J. D.....Minneapolis
Sivertson, Ivar .....Minneapolis
Slocumb, Maude .....Minneapolis
Smith, Homer R.....Minneapolis
Smith, Norman M.....Minneapolis
Soderlind, A.....Minneapolis
Soper, John.....Minneapolis
Spratt, C. N.....Minneapolis
Staples, H. L.....Minneapolis
Stomel, Joseph .....Minneapolis
Strachauer, A. C.....Minneapolis
Strout, E. S.....Minneapolis
Strout, G. E.....Minneapolis
Stuhr, Henry C.....Minneapolis
Sweetser, H. B.....Minneapolis
Sweitzer, S. E.....Minneapolis
Taft, J. O.....Minneapolis
Taft, Walter L.....Minneapolis
Tanner, A. C.....Minneapolis
Taylor, Rood.....Minneapolis
Tennyson, Theo. .....Minneapolis
Thomas, D. O.....Minneapolis
Thomas, Geo. E.....Minneapolis
Thomas, Geo. H.....Minneapoolis
Thomas, G. T.....Minneapolis
Thompson, H. H.....Minneapolis
Tingdale, A. C.....Minneapolis
Tyrrell, C. C.....Minneapolis
Ulrich, Henry L.....Minneapolis
Ulrich, Mable S.....Minneapolis
Undine, A. Clyde.....Minneapolis
Voyer, Oswald.....Minneapolis
Van Deboget, L.....Minneapolis
Wanous, E. Z.....Minneapolis
Ward, A. W.....Minneapolis
Warham, T. T.....Minneapolis
Warwick, Margaret ....Minneapolis
Watson, C. W.....Minneapolis
Watson, J. A.....Minneapolis
Wells, H. J.....Minneapolis
Weston, C. G.....Minneapolis
Weum, Thurston W....Minneapolis
White, S. Marx.....Minneapolis
Wilcox, Archa E.....Minneapolis
Williams, Robt. .....Minneapolis
Williams, U. G.....Minneapolis
Wilson, Hugh S.....Minneapolis
Wood, Douglas F.....Minneapolis
Woodard, F. R.....Minneapolis
Woodward, F. O.....Minneapolis
Woodworth, Elizabeth..Minneapolis
Wright, C. D.....Minneapolis
Wright, Franklin R.....Minneapolis
Yoerg, O. W.....Minneapolis
Zaworski, E. A.....Minneapolis
Ziskin, Thos. .....Minneapolis

Wright County Medical Society

Regular meetings, quarterly
Annual meeting, first Monday in October

President
Roseau, Victor.....Maple Lake
Secretary
Thoreson, Thor. .....Buffalo
Catlin, John J.....Buffalo

Freed, O. J. R.....Cokato
Harriman, Leonard...Howard Lake
Hawkins, E. P.....Montrose
Holm, H. H.....Cokato
Metcalf, Jas. V.....Monticello

Moffatt, A. G.....Howard Lake
Phillips, A. E.....Delano
Ridgway, A. M.....Annandale
Roseau, Victor.....Maple Lake
Shraeder, E. E.....Watertown
Thoreson, Thor. .....Buffalo

Stearns-Benton County Medical Society

Regular meetings, third Thursday in month
Annual meeting, April

President
Rice, Geo. D.....St. Cloud
Secretary
Beebe, W. L.....St. Cloud
Ausman, C. F.....Paynesville
Beaty, J. H.....St Cloud
Beebe, W. L.....St. Cloud
Brigham, C. F.....St. Cloud
Boehm, J. C.....St. Cloud
Clark, H. B.....St. Cloud
DuBois, J. A.....Sauk Center
DuBois, J. F.....Sauk Center

Dunn, J. B.....St. Cloud
Freeman, W. L.....Foley
Fresleben, Wm.....Sauk Rapids
Gelz, J. J.....Richmond
Glyer, R. T.....Brooten
Goehrs, H. W.....Melrose
Hemstead, Werner .....St. Cloud
Hilbert, P. A.....Melrose
Holdridge, Geo. A.....Foley
Kuhlman, Aug. .....Melrose
Lamb, H. L.....Sauk Center
Lewis, C. B.....St. Cloud
Lewis, E. J.....Sauk Center
Libert, John .....St. Cloud

McDowell, I. F.....St. Cloud
McKibbon, H. E.....St. Cloud
Moynihan, A. F.....Sauk Center
Pilon, P. C.....Paynesville
Putney, G. E.....Paynesville
Rathbun, A. M.....Rice
Rice, Geo. D.....St. Cloud
Ridgeway, Alex.....Belgrade
Sherwood, Geo. E.....Kimball
Staugh, Phil.....St. Cloud
Sutton, C. S.....St. Cloud
Townsend, DeWayne.....Belgrade
Watson, Tolbert.....Albany
Whiting, A. D.....St. Cloud

Kandiyohi-Swift County Medical Society

Regular meetings, third Thursday in December, March, June and September
Annual meeting, third Thursday in December

President
Branton, B. J.....Willmar
Secretary
Jacobs, John C.....Willmar
Benson, I. S.....Willmar
Branton, B. J.....Willmar

Daignault, Oscar .....Benson
Danson, P. C.....Willmar
Frost, E. H.....Willmar
Jacobs, John C.....Willmar
Johnson, Christian .....Willmar
Johnson, Hans .....Kerkhoven

Johnston, Edmund B.....Benson
Kaufman, Wm. C.....Appleton
Kolset, Carl D.....Benson
Rains, J. M.....Willmar
Scofield, C. L.....Benson
Shelver, H. J.....Ortonville

FIFTH DISTRICT

COUNCILOR, H. M. WORKMAN, M. D. (3 years) ..... Tracy

Camp Release District Medical Society

Yellow Medicine, Renville, Lac Qui Parle, Chippewa, and Sibley
Regular meetings, fourth Thursday, January, April, July, October
Annual meeting, fourth Thursday, October

President
Adams, R. C. ..... Bird Island

Secretary
Peterson, H. E. ..... Granite Falls

Adams, R. C. ..... Bird Island
Ardnich, F. H. ..... Belview
Bacon, R. S. ..... Montevideo
Bergh, L. N. ..... Montevideo
Burns, M. A. ..... Milan
Bushey, W. E. ..... Arlington
Clay, E. M. ..... Renville
Cole, H. B. ..... Redwood Falls
Crandall, A. M. ..... Madison
Duclos, J. A. ..... Henderson
Eisengraeber, G. A. ..... Granite Falls
Ferguson, J. B. ..... St. Paul
Flower, W. Z. ..... Minneapolis
Gaines, E. C. ..... Buffalo Lake
Gammell, H. W. ..... Madison
Guyer, L. G. ..... Waseca
Hauge, M. M. ..... Clarkfield
Holmberg, L. J. ..... Canby
Johnson, C. M. ..... Dawson
Johnson, H. M. ..... Dawson
Jones, D. N. ..... Minneapolis
Kanne, C. W. ..... Arlington
Kilbride, J. S. ..... Canby
Lee, Walter N. ..... Madison
Lima, Ludwig ..... Montevideo
Lund, S. O. ..... Montevideo
Maercklein, S. R. ..... Renville
Mesker, G. H. ..... Olivia
Nelson, N. A. ..... Dawson
Passer, A. A. ..... Olivia
Penham, F. W. ..... Morton
Peterson, H. E. ..... Granite Falls
Puffer, F. L. ..... Bird Island
Sanderson, A. G. ..... Granite Falls
Smith, L. G. ..... Montevideo
Stensrud, A. A. ..... Dawson
Walker, G. H. ..... Fairfax
Westby, N. ..... Madison
Zimbeck, R. D. ..... Maynard

Brown-Redwood County Medical Society

Regular meeting, June
Annual meeting, June

President
Walker, C. C. ..... Lamberton

Secretary
Meierding, Wm. A. ..... Springfield

Adams, James L. ..... Morgan
Jamieson, Earl ..... Walnut Grove
Meierding, Wm. A. ..... Springfield
Rothenberg, J. C. ..... Springfield
Shrader, J. S. ..... Springfield
Strickler, Mary ..... Sleepy Eye
Sundt, Mathias ..... Hanska
Walker, C. C. ..... Lamberton

Lyon-Lincoln County Medical Society

Regular meetings, first Tuesday in February, May, July and October
Annual meeting in February

President
Hoidale, A. D. ..... Tracy

Secretary
Workman, Harper M. ..... Tracy

Bacon, C. G. ..... Marshall
Bossingham, O. N. ..... Lake Benton
Hoidale, A. D. ..... Tracy
Jensen, J. C. ..... Hendricks
Persons, C. E. ..... Marshall
Robertson, J. B. ..... Cottonwood
Sanderson, E. T. ..... Minneota
Thordardson, Theo. ..... Minneota
Vadheim, A. L. ..... Tyler
Valentine, W. H. ..... Tracy
Workman, H. M. ..... Tracy
Workman, W. G. ..... Tracy

SIXTH DISTRICT

COUNCILOR, F. R. WEISER, (1 year) ..... Windom

Southwestern Minnesota Medical Society

Pipestone, Rock, Nobles, Murray, and Cottonwood Counties
Regular meetings, second Thursday in May and November
Annual meeting in November

President
McKeown, E. G. ..... Pipestone

Secretary
Watson, F. G. ..... Worthington

Allin, R. W. ..... Heron Lake
Arnold, E. W. ..... Adrian
Balcom, G. G. ..... Lake Wilson
Bong, J. H. ..... Jasper
Brown, A. H. ..... Pipestone
Chadbourne, A. G. ..... Heron Lake
Cross, P. J. ..... Ellsworth
De Boer, Hermanus ..... Edgerton
Dohms, H. C. ..... Slayton
Dolan, C. P. ..... Worthington
Dudley, J. H. ..... Windom
Goldberg, M. L. ..... Jasper
Goldon, C. M. ..... Ruthon
Hilger, J. M. ..... Iona
Hitchings, W. P. ..... Lakefield
Jenckes, H. D. ..... Pipestone
Knudtson, H. M. ..... Pipestone
Leebens, J. H. ..... Lismore
Lowe, Thos. ..... Pipestone
McCrea, James ..... Fulda
McIntyre, John A. ..... Round Lake
McKeown, E. G. ..... Pipestone
Maitland, David P. ..... Jackson
Manson, F. M. ..... Worthington
May, C. C. ..... Adrian
Metcalf, F. W. ..... Fulda
Mork, B. O. ..... Worthington
Patterson, N. E. ..... Worthington
Piper, Wm. A. ..... Mountain Lake
Ravn, B. ..... Windom
Richardson, W. E. ..... Pipestone
Richmond, Chas. D. ..... Jeffers
Rose, J. T. ..... Lakefield
Sherman, C. L. ..... Luverne
Smallwood, J. T. ..... Worthington
Sogge, L. ..... Windom
Spalding, A. E. ..... Luverne
Stanley, Court R. ..... Fulda
Taylor, Wm. J. ..... Pipestone
Thorson, E. O. ..... Luverne
Tofti, Josephine ..... Pine City
Waller, Jos. D. ..... Wilmont
Watson, F. G. ..... Worthington
Weedow, Henry ..... Worthington
Weiser, F. R. ..... Windom
Williams, A. L. ..... Slayton
Wright, C. O. ..... Luverne

Blue Earth Valley Medical Society

Regular meetings, fourth Thursday, May and October
Annual meeting, fourth Thursday May

President
Broberg, J. A.....Blue Earth
Secretary
Hunt, R. C.....Fairmont
Bailey, H. B.....Ceylon
Blong, P. H.....Elmore
Broberg, J. A.....Blue Earth
Butz, J. A.....Monterey

Chambers, W. C.....Blue Earth
Dewey, G. W.....Fairmont
Farrage, J. H.....Winnebago City
Farrish, R. C.....Sherburn
Gough, W. H.....Granada
Gullixson, A.....Bricelyn
Holm, P. F.....Wells
Hunt, F. N.....Fairmont
Hunt, R. C.....Fairmont

Hunte, A. F.....Truman
Jacobs, A. C.....Elmore
Logan, F. W.....Blue Earth
Luedtke, G. H.....Fairmont
McGwarty, J. J.....Easton
Richardson, W. J.....Fairmont
Strobel, W. G.....Welcome
Urstad, O. H.....Kiester
Wilson, C. E.....Blue Earth

Watonwan County Medical Society

Regular meetings, none
Annual meeting, December

President
McCarthy, W. J.....Madelia
Secretary
Haynes, B. H.....St. James

Grimes, H. B.....Madelia
Hagen, O. E.....Butterfield
Haynes, B. H.....St. James
Kabrick, O. A.....Odin

Lisar, G. M.....St. James
McCarthy, W. J.....Madelia
Rowe, W. H.....St. James
Thompson, Albert.....St. James

SEVENTH DISTRICT

COUNCILOR, F. A. DODGE, M. D. (2 years).....Le Sueur

Nicollet-LeSueur County Medical Society

Regular meetings, September and December
Annual meeting, Second Tuesday in December

President
Baskett, Olive T.....St. Peter
Secretary
Le Clerc, J. E.....Le Sueur
Aitkins, H. B.....Le Sueur Center
Baskett, Geo. T. .....St. Peter
Baskett, Olive T.....St. Peter

Blakely, C. C.....St. Peter
Covell, W. W.....St. Peter
Daniels, J. W.....St. Peter
Dodge, F. A.....Le Sueur
Freeman, Geo. H.....Willmar
Hartung, H. H.....Le Sueur
Le Clerc, J. E.....Le Sueur

McDougald, D. W.....Le Sueur
McIntyre, G. W.....St. Peter
Merritt, G. F.....St. Peter
Olson, R. G.....Nicollet
Phelps, R. M.....St. Peter
Strathern, F. P.....St. Peter
Woodworth, L. F...Le Sueur Center

McLeod County Medical Society

Regular meetings, January, April, July, October
Annual meeting, January

President
Clement, J. B.....Lester Prairie
Secretary
Maurer, E. L.....Brownton

Axilrod, D. L.....Hutchinson
Barrett, E. E.....Glencoe
Bolles, D. W.....Minneapolis
Clement, J. B.....Lester Prairie

Maurer, E. L.....Brownton
Sheppard, Fred.....Hutchinson
Sheppard, P. E.....Hutchinson
Tinker, C. W.....Stewart

Scott-Carver Medical Society

Regular meetings, first Thursday March, June, September, December
Annual meeting, first Thursday in December

President
Landenberger, John....New Prague
Secretary
Reiter, H. W.....Shakopee
Von Bohland, F. J.....Belle Plaine
Buck, Fred H.....Shakopee

Cannady, E. E.....Prior Lake
Fischer, H. P.....Shakopee
Fischer, P. M.....Shakopee
Hendricksen, H. G.....New Market
Landenberger, John....New Prague
Maertz, W. F.....New Prague

Moloney, G. R.....New Prague
Novak, E. E.....New Prague
Phillips, Wm. H.....Jordan
Reiter, H. W.....Shakopee
Schneider, H. A.....Jordan
White, J. B.....Belle Plaine

Goodhue County Medical Society

Regular meetings, January, April, July, October
Annual meeting, January 15th, 1920

President
Conley, Alva A.....Cannon Falls
Secretary
Werner, N. F.....Red Wing

Claydon, L. E.....Red Wing
Conley, A. A.....Cannon Falls
Conley, H. E.....Cannon Falls
Cremer, M. H.....Red Wing

Jones, A. W.....Red Wing
Sawyer, H. P.....Goodhue
Smith, M. W.....Red Wing
Werner, N. F.....Red Wing

Rice County Medical Society

Regular meetings, first Wednesday, January, April, July, October
Annual meeting, first Wednesday in January

President
Robilliard, W. H.....Faribault

Secretary
Davis, Fred U.....Faribault

Babcock, F. M.....Northfield
Davis, F. U.....Faribault
Haessley, S. B.....Faribault
Hanson, A. M.....Faribault
Hunt, W. A.....Northfield
Huxley, F. R.....Faribault
Lane, Laura A.....Faribault
Lee, W. P.....Northfield
Lexa, F. J.....Lonsdale
Mayland, M. L.....Faribault
Morse, W. E. H.....Morristown
Phillips, J. G.....Northfield
Plonske, C. J.....Faribault
Robilliard, C. M.....Faribault
Robilliard, W. H.....Faribault
Rumpf, W. H.....Faribault
Smith, P. A.....Faribault
Theissen, W. H.....Faribault
Traeger, C. A.....Faribault
Warren, F. S.....Faribault
Weinburgh, W. H.....Waterville
Wilson, Warren .....Northfield

Wabasha County Medical Society

Regular meetings, annually first Thursday after first Monday in July

President
Slocumb, J. A.....Plainview

Secretary
Wilson, W. F.....Lake City

Bayley, E. H.....Lake City
Bowers, H. E.....Lake City
Bowers, J. T.....Lake City
Dempsey, D. P.....Kellogg
Fleischhauer, D. S.....Wabasha
French, E. A.....Plainview
Heagerty, W. B.....Mazeppa
Radabaugh, R. C.....Hastings
Rankin, A. A.....Zumbro Falls
Schmidt, G. .....Lake City
Slocumb, J. A.....Plainview
Wilson, W. F.....Lake City

EIGHTH DISTRICT

COUNCILOR, W. F. BRAASCH, M. D. (3 years).....Rochester

Blue Earth County Medical Society

Regular meetings, last Monday of each month
Annual meeting, last Monday in December

President
Pratt, C. C.....Mankato

Secretary
Osborn, Lida .....Mankato

Andrews, J. W.....Mankato
Andrews, R. N.....Mankato
Benham, E. W.....Mankato
Black, Wm.....Mankato
Dahl, G. A.....Mankato
Denman, A. V.....Mankato
Franchere, F. W.....Lake Crystal
Hielscher, Helen .....Mankato
Hielscher, J. A.....Mankato
Holbrook, J. S.....Mankato
Holman, C. J.....Mankato
James, J. H.....Mankato
Kelly, T. C.....Mankato
Kemp, A. F.....Mankato
Liedloff, A. G.....Mankato
Lloyd, H. J.....Mankato
Merrill, J. E.....Amboy
Miller, V. J.....Mankato
Osborn, Lida .....Mankato
Pratt, C. C.....Mankato
Schlesselman, J. T.....Mankato
Schmitt, A. F.....Mankato
Sohmer, A. E.....Mankato
Wentworth, A. J.....Mankato
Williams, Hugh O.....Lake Crystal
Williams, John .....Lake Crystal
Wohlrabe, A. A.....Mankato

Houston-Fillmore County Medical Society

Regular meetings, May, August, October
Annual meeting, October

President
Helland, G. M.....Spring Grove

Secretary
Fischer, O. F.....Houston

Anderson, Norman E.....Harmony
Browning, W. E.....Caledonia
Collins, J. S.....Caledonia
Drake, F. A.....Lanesboro
Eby, Cyrus B.....Spring Valley
Fischer, O. F.....Houston
Foster, Bainbridge....Spring Valley
Grinnell, W. B.....Preston
Helland, G. M.....Spring Grove
Helland, J. W.....Spring Grove
Johnson, Chas. H.....Spring Valley
Kendrick, W. N.....Spring Valley
Kibbe, O. A.....Canton
Kierland, P. E.....Harmony
Lannin, J. C.....Mabel
Lommen, A. P.....Lanesboro
Love, George A.....Preston
Nass, H. A.....Mabel
Nelson, M. S.....Spring Grove
Onsgard, C. K.....Rushford
Onsgard, L. K.....Houston
Rhines, D. C.....Caledonia
Sather, E. R.....Spring Valley
Simons, E. V.....Spring Valley
Tierney, C. M.....Granger
Utley, J. D.....St. Paul
Walker, Jas. D.....Wykoff
Williams, R. V.....Rushford
Woodruff, C. W.....Chatfield

Mower County Medical Society

Regular meetings, second Wednesday in January, April, July and October
Annual meeting, second Wednesday in October

President
Hartel, G. E.....Austin

Secretary
Baker, G. L.....Austin

Allen, A. W.....Austin
Allen, C. C.....Austin
Baker, G. L.....Austin
Coleman, F. B.....Austin
Grise, W. B.....Austin
Hart, M. J.....Le Roy
Hegge, C. A.....Austin
Hegge, O. H.....Austin
Henslin, A. E.....Le Roy
Hartel, G. E.....Austin
Leck, C. C.....Austin
Lewis, C. F.....Austin
Melzer, G. R.....Lyle
Mitchell, R. S.....Grand Meadow
Moore, W. J.....Adams
Morse, M. P.....Le Roy
Pierson, H. F.....Austin
Rebman, E. C.....Austin
Schottler, G. J.....Dexter
Torkelson, P. T.....Lyle
Ward, W. J.....Rose Creek
Warren, C. L.....Le Roy

Olmstead County Medical Society

Regular meetings, April, June, September, December
Annual meeting, first Wednesday in December

President
Russell, H. R.....Stewartville
Secretary
Pollock, Lee W.....Rochester
Adson, A. W.....Rochester
Allen, W. A.....Rochester
Archibald, A. A.....Rochester
Asbury, J. F.....Rochester
Balfour, D. C.....Rochester
Barlow, R. A.....Rochester
Benedict, W. L.....Rochester
Berkman, D. M.....Rochester
Bleifus, W. F.....Rochester
Bonness, Hazel .....Rochester
Bowing, H. H.....Rochester
Braasch, W. F.....Rochester
Broders, A. C.....Rochester
Bumpus, H. C.....Rochester
Crenshaw, J. L.....Rochester
Crewe, J. E.....Rochester
Dolder, F. C.....Eyota
Eusterman, G. B.....Rochester
Evarts, Arah B.....Rochester
Fawcett, C. E.....Stewartville
Fisher, Carl .....Rochester
Gamble, J. W.....Rochester
Giffin, H. Z.....Rochester
Graham, Christopher ....Rochester
Grainger, C. F.....Rochester
Grainger, S. Booker.....Rochester
Hallenbeck, D. F.....Rochester
Hayes, James M.....Rochester
Henderson, M. S.....Rochester
Heyerdale, O. C.....Rochester
Hollberg, C. A.....Rochester
Howard, S. E.....Rochester
Huffman, R. W.....Elgin
Hunt, V. C.....Rochester
Joyce, S. T.....Rochester
Judd, E. S.....Rochester
Kilbourne, A. F.....Rochester
Lemon, W. S.....Rochester
Lillie, H. I.....Rochester
Linton, W. B.....Rochester
Logan, A. H.....Rochester
Lyon, H. R.....Rochester
Mark, A. E.....Rochester
Masson, J. C.....Rochester
Mayo, C. H.....Rochester
Mayo, W. J.....Rochester
Melson, O. C.....Rochester
Meyerding, H. W.....Rochester
Moore, A. B.....Rochester
Mosse, F. R.....Rochester
Muehlig, G. F.....Rochester
Mussey, R. D.....Rochester
New, G. B.....Rochester
Ohlinger, L. B.....Rochester
Pemberton, J. deJ.....Rochester
Piper, M. C.....Rochester
Plummer, H. S.....Rochester
Plummer, W. A.....Rochester
Pollock, Lee W.....Rochester
Prangen, A. D.....Rochester
Rosenow, E. C.....Rochester
Russell, H. R.....Stewartville
Sanford, A. H.....Rochester
Sheldon, W. D.....Rochester
Sistrunk, W. E.....Rochester
Smith, F. L.....Rochester
Stacy, L. J.....Rochester
Steven, Geo. .....Byron
Stokes, J. H.....Rochester
Szlapka, T. L.....Rochester
White, P. A.....Rochester
Willius, F. A.....Rochester
Wilson, L. B.....Rochester
Witherstine, H. H.....Rochester

Waseca County Medical Society

Regular meetings, second Monday in December
Annual meeting, second Monday in December

President
Chamberlin, W. A.....Waseca
Secretary
Rudolf, A. J.....Waseca
Blanchard, H. G.....Waseca
Chamberlin, W. A.....Waseca
Cory, W. M.....Waterville
Hagen, H. O.....New Richland
Joyce, T. M.....Janesville
Lynn, J. F.....Waseca
McIntire, H. M.....Waseca
O'Hara, J. J.....Janesville
Rudolf, A. J.....Waseca
Swartwood, F. A.....Waseca

Winona County Medical Society

Regular meetings, first Tuesday January, April, July, October
Annual meeting in January

President
Lester, C. A.....Winona
Secretary
Robbins, C. P.....Winona
Bear, H. C.....St. Charles
Benoit, F. T.....Winona
Clay, F. H.....St. Charles
Gates, G. L.....Winona
Heise, W. F. C.....Winona
Keyes, E. D.....Winona
Leicht, Oswald .....Winona
Lester, C. A.....Winona
Lichtenstein, Hans .....Winona
Lindsay, W. V.....Winona
Lynch, J. L.....Winona
McLaughlin, E. M.....Winona
Neuman, C. A.....Lewiston
Neuman, W. A.....Lewiston
Nauth, W. H.....Winona
Pritchard, D. B.....Winona
Robbins, C. P.....Winona
Rollins, F. H.....St. Charles
Rosenberg, B. P.....Winona
Schaefer, S.....Winona
Scott, J. W.....St. Charles
Stachniewiez, V. J.....Winona
Steiner, Irving.....Winona
Tweedy, G. J.....Winona

Freeborn County Medical Society

Regular meetings, quarterly
Annual meeting in May

President
Von Berg, J. P.....Albert Lea
Secretary
Stevenson, R. G.....Albert Lea
Bessesen, W. A.....Albert Lea
Burns, H. D.....Albert Lea
Buttruff, C. R.....Freeborn
Calhoun, F. W.....Albert Lea
Davis, F. W.....Alden
Freeman, J. P.....Glenville
Kamp, B. A.....Albert Lea
McCreight, Geo. .....Albert Lea
Nannestad, J. R.....Albert Lea
Palmer, W. L.....Albert Lea
Schultz, J. A.....Albert Lea
Stevenson, R. G.....Albert Lea
Von Berg, J. P.....Albert Lea

ALPHABETICAL ROSTER

Abbott, A. W.....Minneapolis
Abbott, J. S.....St. Paul
Abbott, Wm. P.....Duluth
Abramovich, J. H.....St. Paul
Adair, F. L.....Minneapolis
Adair, John H.....Owatonna
Adams, B. S.....Hibbing
Adams, J. L.....Morgan
Adams, R. C.....Bird Island
Adkins, C. M.....Grygla
Adson, A. W.....Rochester
Aherns, A. E.....St. Paul
Aherns, A. H.....St. Paul
Aitkins, H. B.....LeSueur Center
Alden, J. F.....St. Paul
Aldes, Harry.....St. Paul
Aldrich, F. H.....Belview
Alexander, F. H.....St. Paul
Allaben, Gerald R.....Buhl
Allen, A. W.....Austin
Allen, C. C.....Austin
Allen, F. A.....Crosby
Allen, F. H.....Staples
Allen, H. W.....Minneapolis
Allen, Mason.....St. Paul
Allen, R. W.....Heron Lake
Allen, Wilson A.....Rochester
Ancker, A. B.....St. Paul
Anderson, A. E.....Minneapolis
Anderson, Arndt G.....Minneapolis
Anderson, C. A.....Rush City
Anderson, Norman E.....Harmony
Andrews, J. W.....Mankato
Andrews, Roy M.....Mankato
Andrist, J. W.....Owatonna
Araouni, Khalil.....St. Paul
Archibald, A.....Rochester
Archibald, F. M.....Mahnomen
Arends, Archibald.....St. Paul
Arey, H. C.....Excelsior
Arminen, R. V.....Duluth
Armstrong, J. M.....St. Paul
Arnold, E. W.....Bigelow
Arzt, C. P.....St. Paul
Asbury, J. F.....Rochester
Aurand, W. H.....Minneapolis
Ausman, Carl F.....Paynesville
Avery, J. Fowler.....Minneapolis
Axilrod, D. L.....Hutchinson
Ayers, Geo. T.....Ely

Babcock, F. M.....Northfield
Bacon, C. G.....Marshall
Bacon, H. P.....Milaca
Bacon, Knox.....St. Paul
Bacon, L. C.....St. Paul
Bacon, R. S.....Montevideo
Badeaux, Geo. T.....Brainerd
Bagley, W. R.....Duluth
Baier, Florence C.....Minneapolis
Bailey, H. B.....Ceylon
Baker, G. L.....Austin
Baker, H. A.....Minneapolis
Balcom, G. G.....Lake Wilson
Balcome, F. E.....St. Paul
Baldwin, L. B.....Minneapolis
Balfour, Donald C.....Rochester
Ball, C. R.....St. Paul
Barlow, R. A.....Rochester
Barney, Leon C.....Duluth
Barrett, E. E.....Glencoe
Barron, Moses.....Minneapolis
Barsness, Nellie.....St. Paul
Barton, E. K.....Minneapolis
Baskett, Geo. T.....St. Peter
Baskett, Olive T.....St. Peter
Baxter, S. H.....Minneapolis
Bayley, E. H.....Lake City
Beach, Geo. Wm....Cacak, Serbia
Beadle, W. D.....Cannon Falls
Beals, Hugh.....St. Paul
Bear, H. C.....St. Charles
Beaty, J. H.....St. Cloud
Beckley, F. L.....St. Paul
Beebe, Warren L.....St. Cloud
Beise, R. A.....Brainerd
Bell, J. Warren Jr.....Minneapolis
Bell, J. W.....Minneapolis
Benedict, E. E.....Minneapolis
Benedict, W. L.....Rochester
Benepe, L. M.....St. Paul
Benham, E. W.....Mankato
Benjamin, A. E.....Minneapolis
Benn, F. G.....Minneapolis
Bennion, P. H.....St. Paul
Benoit, F. T.....Winona
Benson, G. E.....Minneapolis
Benson, Iver S.....Minneapolis
Bentley, Norman P.....St. Paul
Bergh, L. M.....Montevideo
Bergquist, K. E.....Duluth
Berkman, D. M.....Rochester
Berrisford, P. D.....St. Paul
Bertelsen, O. L.....Crookston
Bessesen, A. N.....Minneapolis
Bessesen, W. A.....Albert Lea
Bettingen, J. W.....St. Paul
Biederman, J....Thief River Falls
Binet, H. E.....Grand Rapids
Binger, H. E.....St. Paul
Bishop, Chas. W.....Minneapolis
Bissell, Frank S.....Minneapolis
Black, Wm.....Mankato
Blacklock, S. S.....Hibbing
Blakley, C. C.....St. Peter
Blanchard, H. G.....Waseca
Blegen, H. M.....Warren
Bleifuss, W. F.....Rochester
Blong, P. H.....Elmore
Bock, R. A.....St. Paul
Boeckmann, Eduard.....St. Paul
Boeckmann, Egil.....St. Paul
Boehm, J. C.....St. Cloud
Bohland, E. H.....St. Paul
Bohland, F. J. von....Belle Plaine
Bohling, Bernard S.....Sandstone
Bole, R. S.....St. Paul
Boleyn, E. S.....Stillwater
Bolles, D. W.....Minneapolis
Bolsta, Charles.....Ortonville
Bolstad, H. C.....St. Paul
Bone, Merle.....Kelliher
Bong, J. H.....Jasper
Bonness, Hazel.....Rochester
Booth, A. E.....Minneapolis
Boreen, Clifton A.....Minneapolis
Borreson, B.....Warren
Bossingham, O. M....Lake Benton
Bouman, H. A.....Minneapolis
Boutelle, Louisa E.....Minneapolis
Bowers, H. E.....Lake City
Bowers, J. T.....Lake City
Bowing, H. H.....Rochester
Boyer, S. H.....Duluth
Braasch, W. F.....Rochester
Bracken, H. M.....Minneapolis
Braden, A. J.....Duluth
Branton, B. J.....Willmar
Bratrud, A. F.....Minneapolis
Bratrud, O. E.....Fertile
Bratrud, Theo.....Warren
Bray, C. W.....Biwabik
Bray, E. R.....St. Paul
Briggs, F. W.....Fargo
Brigham, C. F.....St. Cloud
Brimhall, J. B.....St. Paul
Brinberg, T. L.....St. Paul
Broberg, J. A.....Blue Earth
Brodie, Walter D.....St. Paul
Broders, A. C.....Rochester
Brooks, Chas. M.....Minneapolis
Brooks, D. F.....St. Paul
Brown, A. H.....Pipestone
Brown, E. D.....Minneapolis
Brown, E. I.....St. Paul
Brown, E. J.....Minneapolis
Brown, J. C.....St. Paul
Brown, Paul F.....Minneapolis
Brown, R. S.....Minneapolis
Brown, S. E.....St. Paul
Browning, W. E.....Caledonia
Brunet, L. M.....Cloquet
Buck, Fred H.....Shakopee
Buckley, E. W.....St. Paul
Bullen, F. V.....Hibbing
Bumpus, H. C.....Rochester
Burch, F. E.....St. Paul
Burfiend, G. H.....Afton
Burns, F. W.....St. Paul
Burns, H. D.....Albert Lea
Burns, H. J.....Duluth
Burns, M. A.....Milan
Burns, R. M.....St. Paul
Bushey, M. E.....Arlington
Buttruff, C. R.....Freeborn
Butz, J. A.....Monterey
Byrnes, W. J.....Minneapolis
Cabot, Verne S.....Browerville
Caine, C. E.....Morris
Calhoun, Frank W.....Albert Lea
Cameron, J. A.....St. Paul
Camp, W. E.....Minneapolis
Campbell, A. A.....Ogema
Campbell, E. P.....St. Paul
Campbell, L. M.....Minneapolis
Campbell, J. E.....So. St. Paul
Campbell, R. A.....Minneapolis
Cannady, E. E.....Prior Lake
Cannon, C. M.....St. Paul
Cannon, Harry.....St. Paul
Carlaw, C. M.....Minneapolis
Carman, Chas. L.....St. Paul
Carman, J. E.....Detroit
Carman, Paul I.....St. Paul
Carroll, Wm. C.....St. Paul
Carstens, C. F.....Hibbing
Cosgrove, J. H.....Duluth
Catlin, John J.....Buffalo
Catlin, T. J.....Palisade
Cavanaugh, J. O.....St. Paul
Chamberlain, J. W.....St. Paul
Chamberlain, W. A.....Waseca
Chambers, W. C.....Blue Earth
Chapman, O. S.....Minneapolis
Chapman, T. L.....Duluth
Chapman, W. E.....Litchfield
Chadbourn, A. G.....Heron Lake
Chatterton, C. C.....St. Paul
Cheleen, S. J.....Minneapolis
Cheney, E. L.....Duluth
Chowning, W. M.....Minneapolis
Christenson, C. R.....Morris
Christianson, Andrew.....St. Paul
Christie, G. R.....Long Prairie
Christison, J. T.....St. Paul
Cirkler, A. A.....Minneapolis
Clark, F. F.....Duluth
Clark, G. E.....Stillwater
Clark, Harry B.....St. Cloud
Clark, H. S.....Minneapolis
Clark, T. C.—
Soldiers Home, Minneapolis
Clay, E. M.....Renville
Clay, F. H.....St. Charles
Claydon, L. E.....Red Wing
Clement, J. B.....Lester Prairie
Clifton, Theodore A.....Isanti
Conheim, Eva.....St. Paul
Cobb, S. G.....St. Paul
Cochrane, W. J.....Minneapolis
Cole, Herman B....Redwood Falls
Cole, Wallace.....St. Paul
Coleman, F. B.....Austin
Coller, H. G.....Brainerd
Collins, Arthur N.....Duluth
Collins, Homer C.....Duluth
Collins, J. S.....Caledonia
Colvin, A. R.....St. Paul
Comstock, A. E.....St. Paul
Condit, W. H.....Minneapolis
Conley, A. A.....Cannon Falls
Conley, H. E.....Cannon Falls
Cook, Paul B.....St. Paul
Cooney, H. C.....Princeton
Corbett, J. F.....Minneapolis
Corrigan, J. E.....Baudette
Cory, Wm.....Waterville
Cosman, E. O.....Minneapolis
Courtney, Walter.....Brainerd
Covell, W. W.....St. Peter
Coventry, W. A.....Duluth
Cowern, E. W.....No. St. Paul
Conner, Wm. H.....Finlayson
Crafts, L. M.....Minneapolis
Crandall, A. M.....Madison
Cremer, M. H.....Red Wing
Crenshaw, John L.....Rochester
Cress, P. J.....Ellsworth
Crewe, John E.....Rochester
Crowe, J. H.....Virginia
Crume, Geo. P.....Minneapolis
Cutts, Geo.....Minneapolis

Dahl, G. A.....Mankato
Dahlquist, G. W.....Lancaster
Daignault, Oscar .....Benson
Dampier, C. E.....Crookston
Daniels, J. W.....St. Peter
Danielson, Karl A.....Litchfield
Darling, J. B.....St. Paul
Darrow, Daniel C.....Moorhead
Daugherty, E. B.....St. Paul

Daugherty, L. E.....St. Paul
Davis, F. U.....Faribault
Davis, F. W.....Alden
Davis, Herbert.....St. Paul
Davis, Lloyd T.....Wadena
Davis, Luther A.....Wadena
Davis, Wm. .....St. Paul
Davison, P. C.....Willmar
DeBoer, Hermanus.....Edgerton
Dedolph, Karl.....St. Paul
Dempsey, D. P.....Kellogg
Denman, Austin V.....Mankato
Dennis, W. A.....St. Paul
Dewey, G. W.....Fairmont
Deziel, G.....Minneapolis
Dickson, T. H. Jr.....St. Paul
Disen, C. F.....Minneapolis
Dittman, Geo. C.....St. Paul
Dodge, Franklin A.....Le Sueur
Dohm, A. J.....St. Paul
Dohm, W. M.....Farmington
Dolan, C. P.....Worthington
Dolder, F. C.....Eyota
Doms, H. C.....Slayton
Donaldson, C. A.....Minneapolis
Donovan, J. J.....Litchfield
Doolittle, E. F.....Duluth
Doupe, R. G.....Upsala
Doxey, G. L.....Minneapolis
Drake, C. B.....St. Paul
Drake, C. R.....Minneapolis
Drake, F. A.....Lanesboro
Dredge, H. P.....Sandstone
Dreisbach, N.....Minneapolis
Drenning, F. C.....Duluth
Dryden, F. M.....Crookston
DuBois, Julian.....Sauk Center
Duclos, J. A.....Henderson
Dudley, J. H.....Windom
Dulude, S. .....Dassel
Dunlop, A. H.....Crookston
Dunn, John B.....St. Cloud
Dunsmoor, F. A.....Minneapolis
Dutton, C. E.....Minneapolis

Earl, George A.....St. Paul
Earl, R. O.....St. Paul
Eberlin, E. A.....Glenwood
Eby, Cyrus B.....Spring Valley
Egan, John M.....Minneapolis
Eggen, O. K.....Minneapolis
Eisengraeber, G. A...Granite Falls
Eitel, Geo. G.....Minneapolis
Eklund, J. J.....Duluth
Eklund, Wm. J.....Duluth
Elias, F. J....Morgan Park, Duluth
Elsey, J. R.....Glenwood
Ely, Orriman S.....So. St. Paul
Engberg, Ed. J.....St. Paul
Erb, Frederick A.....Minneapolis
Erdmann, Chas. A.....Minneapolis
Erickson, J. G.....Minneapolis
Ernest, Geo. C.....St. Paul
Ertel, E. Q.....Ellendale
Eshelby, E. C.....St. Paul
Essing, C. F.....Wheaton
Eusterman, Geo. B.....Rochester
Evarts, Arah B.....Rochester
Evert. J. A.....Brainerd

Fahey, E. W.....Duluth
Fankbonner, A. V.....Hatley
Fansler, W. A.....Minneapolis
Farmer, J. C.....McKinley
Farr, R. E.....Minneapolis
Farrage, James .....Winnebago
Farrish, R. C.....Sherburn
Fawcett, Chas. E.....Stewartville
Feidt, W. W.....Minneapolis
Ferguson, Jas. B.....St. Paul
Ferguson, J. C.....St. Paul
Fischer, H. P.....Shakopee
Fischer, O. F.....Houston
Fischer, P. M.....Shakopee
Fischer, Carl .....Rochester
Fitzgerald, E. T.....Morris
Fjelstad, C. A.....Austin
Fleischhauer, D. S.....Wabasha
Fleming, A. S.....Minneapolis
Fleming, James .....Cloquet
Flower, W. Z.....Minneapolis
Fogarty, Chas. W.....St. Paul
Forbes, R. S.....Duluth
Foster, Bainbridge...Spring Valley
Franchere, F. W.....Lake Crystal
Franzen, H. G.....Minneapolis
Frazier, Geo. W.....Hill City
Freed, O. J.....Cokato
Freeman, Chas. D.....St. Paul
Freeman, Geo. H.....Willmar
Freeman, J. P.....Glenville
Freeman, W. L.....Foley
Freligh, E. O'B.....Stillwater
French, E. A.....Plainview
Friesleben, Wm.....Sauk Rapids
Froelich, H. W...Thief River Falls
Frost, E. H.....Willmar
Fulton, John.....St. Paul
Furber, W. W.....Cottage Grove

Gager, E. C.....St. Paul
Gaines, E. C.....Buffalo Lake
Gamble, J. W.....Rochester
Gammell, H. W.....Madison
Gardner, E. L.....Minneapolis
Garlock, A. V.....Bemidji
Gates, G. L.....Winona
Geist, Geo. A.....St. Paul
Gelz, John J.....Stearns-Benton
Gendron, J. F. H.....Grand Rapids
Ghent, M. M.....St. Paul
Ghostley, Mary..International Falls
Gibbon, L. L.....Lowry
Giessler, Paul W.....Minneapolis
Giffin, H. Z.....Rochester
Gilfillan, J. S.....St. Paul
Gillespie, N. H.....Duluth
Gillette, A. J.....St. Paul
Gilmore, R. T.....Bemidji
Ginsberg, Wm.....So. St. Paul
Glyer, R. T.....Brooten
Goehrs, H. W.....Melrose
Goldberg, M. L.....Jasper
Golden, C. M.....Ruthton
Goltz, E. V.....St. Paul
Goodheart, C. J.....Akely
Gordon, G. J.....Minneapolis
Gosslee, G. L.....Moorhead
Gotham, C. L.....St. Paul
Gough, W. H.....Granada
Graham, C.....Rochester
Graham, David.....Duluth
Graham, R.....Duluth
Granger, C. F.....Rochester
Granger, Gertrude B.....Rochester
Graves, Carlton.....Aitkin
Grawn, F. A.....Duluth
Gray, C. E.....Rush City
Greeley, L. Q.....Duluth
Greene, Chas. Lyman.....St. Paul
Greene, E. K.....Minneapolis
Grimes, H. B.....Madelia
Grinnell, W. B.....Preston
Grise, W. B.....Austin
Groves, A. F.....Brainerd
Guilford, H. M.....Minneapolis
Gullixson, Andrew .....Bricelyn
Gumper, Jos. B.....Becker
Gunderson, R. M.....Lake Park
Gunz, A. N.....Center City
Guyer, Leo George.....Waseca

Hacking, F. H.....Minneapolis
Haessley, S. B.....Faribault
Hagaman, Geo. K.....St. Paul
Hagen, H. O.....New Richland
Hagen, O. E.....Butterfield
Hagen, Ole J.....Moorhead
Haggard, G. D.....Minneapolis
Haight, G. G.....Audubon
Haines, J. H.....Stillwater
Hall, A. R.....St. Paul
Hall, J. M.....Minneapolis
Hall, Pearl M....State Sanatorium
Hallenback, Dorr F.....Rochester
Hallowell, W. H.....Minneapolis
Hamel, C. E.....Minneapolis
Hamilton, A. S.....Minneapolis
Hammes, E. M.....St. Paul
Hammond, J. F.....St. Paul
Haney, C. L.....Duluth
Hansen, Erling W.....Minneapolis
Hansen, Olga S.....Minneapolis
Hanson, A. M.....Faribault
Hare, Earle R.....Minneapolis
Harriman, L.....Howard Lake
Harrington, C. D.....Minneapolis
Hart, A. B.....Owatonna
Hart, M. J.....LeRoy
Hartung, H. A.....Le Sueur
Hartzell, Thos. B.....Minneapolis
Hauge, M. M.....Clarkfield
Havens, J. G. W.....Owatonna
Haverfield, Addie R....Minneapolis
Hawkins, E. P.....Montrose
Hawkins, V. J.....St. Paul
Hayes, Jas. M.....Rochester
Haynes, B. H.....St. James
Haynes, F. E.....Minneapolis
Head, Geo. Douglas....Minneapolis
Heagerty, W. B.....Mazeppa
Healy, R. T.....Pierz
Heath, A. C.....St. Paul
Hedback, A. E.....Minneapolis
Hegge, C. A.....Austin
Hegge, O. H.....Austin
Heimark, O. E.....Duluth
Heise, W. C. F.....Winona
Helk, H. H.....Minneapolis
Helland, G. M.....Spring Grove
Helland, J. W.....Spring Grove
Hemstead, Werner.....St. Cloud
Henderson, A...Powell River, B. C.
Henderson, M. S.....Rochester
Hendrickson, J. F.....Minneapolis
Hengstler, W. H.....St. Paul
Henriksen, H. G.....New Market
Hensel, Chas. N.....St. Paul
Henslin, A. E.....LeRoy
Hertel, G. E.....Austin
Heseltine, V. G.....Taylors Falls
Hesselgrave, S. S.....St. Paul
Heyerdale, O. C.....Rochester
Hielscher, Helen H.....Mankato
Hielscher, J. A.....Mankato
Higgins, J. H.....Minneapolis
Higgs, Walter W.....Park Rapids
Hilbert, Pierre A.....Melrose
Hilger, A. W.....St. Paul
Hilger, D. D.....St. Paul
Hilger, J. M.....Iona
Hilger, L. A.....St. Paul
Hill, Eleanor J.....Minneapolis
Hill, R. J.....Minneapolis
Hirschboeck, F. J.....Duluth
Hirschfield, M. S.....Duluth
Hitchings, Wm. S.....Lakefield
Hobbs, C. A.....Minneapolis
Hodgson, H. H.....Crookston
Hoff, Alfred .....St. Paul
Hoff, Peder A.....St. Paul
Hoidale, A. D.....Tracy
Hoit, Edward E.....Detroit
Holbrook, J. S.....Mankato
Holcomb, J. T.....St. Paul
Holcomb, O. W.....St. Paul
Holdridge, Geo. A.....Foley
Holl, P. M.....Minneapolis
Hollands, Wm. H.....Fisher
Hollberg, C. A.....Rochester
Holm, H. H.....Cokato
Holm, P. F.....Wells
Holman, C. J.....Mankato
Holman, E. E.....Pine River
Holmberg, L. J.....Canby
Holmes, W. B.....Ada
Holst, C. F.....Little Falls
House, Z. E.....Cass Lake
Houston, C. A.....Park Rapids
Hovde, Hans N.....Duluth
Howard, S. E.....Rochester
Howe, A. W.....Minneapolis
Hubert, R. L.....Bellflower, Cal.
Huenekens, E. J.....Minneapolis
Huffman, R. W.....Elgin
Hulisiek, Harold E.....St. Paul
Hulsman, L. J.....Marble
Humphrey, E. W.....Moorhead
Humphrey, W. R.....Stillwater
Hunt, F. N.....Fairmont
Hunt, H. E.....St. Paul
Hunt, R. C.....Fairmont
Hunt, V. C.....Rochester
Hunt, W. A.....Northfield
Hunte, A. F.....Truman
Hursh, M. M.....Grand Rapids
Huxley, Fred R.....Faribault
Hvoslef, Jakob .....Minneapolis
Hynes, James .....Minneapolis
Hynes, John E.....Minneapolis

Ide, A. W.....Brainerd
Ikeda, Kano .....Minneapolis
Irvine, H. G.....Minneapolis

Jacobs, A. C.....Elmore
Jacobs, J. C.....Willmar
James, J. H.....Mankato
Jamieson, Earl.....Walnut Grove
Jarvis, Bruce W.....Minneapolis
Jenckes, H. D.....Pipestone
Jensen, J. C.....Hendricks
Jensen, M. J.....Minneapolis
Jensen, T. J.....Duluth

Jesion, J. W.....St. Paul
Johnson, August E.....Minneapolis
Johnson, Asa M.....St. Paul
Johnson, Carl M.....Dawson
Johnson, Chas. H....Spring Valley
Johnson, Christian .....Willmar
Johnson, Einer W.....Bemidji
Johnson, Hans .....Kerkhoven
Johnson, Hartland C.....St. Paul
Johnson, Herman M.....Dawson
Johnson, James A.....Minneapolis
Johnson, Julius .....Minneapolis
Johnson, Nimrod A.....Minneapolis
Johnson, Oscar V.....Sebeka
Johnson, R. A.....Minneapolis
Johnson, Theo. H.....St. Paul
Johnston, E. B.....Benson
Jones, A. W.....Red Wing
Jones, D. N.....Minneapolis
Jones, E. M.....St. Paul
Jones, G. M.....Minneapolis
Jones, Herbert W.....Minneapolis
Jones, Richard N.....Minneapolis
Jones, W. A.....Minneapolis
Josewich, Alex.....Minneapolis
Joyce, George .....Rochester
Joyce, T. M.....Janesville
Judd, E. Starr.....Rochester
Judson, W. E.....Duluth
Just, A. A.....Crookston

Kabrick, O. A.....Odin
Kahala, Arthur .....Crookston
Kalinoff, D .....Stillwater
Kamp, Byron A.....Albert Lea
Kannary, E. L.....St. Paul
Kanne, C. W.....Arlington
Karn, B. R.....Ortonville
Kaufman, Wm. C.....Appleton
Kelly, B. W.....Aitkin
Kelly, John V.....St. Paul
Kelly, Paul H.....St. Paul
Kelly, T. C.....Mankato
Kemp, A. F.....Mankato
Kendrick, Wm. N....Spring Valley
Kennedy, C. C.....Minneapolis
Kennedy, R. R.....Minneapolis
Kenyon, Paul E.....Wadena
Kern, M. J..... St. Cloud
Kerrick, Stanley E.....Minneapolis
Kesting, Herman.....St. Paul
Keyes, C. R.....Duluth
Keyes, E. D.....Winona
Kibbe, O. A.....Canton
Kierland, P. E.....Harmony
Kiesling, I. H.....Chisholm
Kilbourne, A. F.....Rochester
Kilbride, J. S.....Canby
Kimball, H. H.....Minneapolis
King, W. R.....Minneapolis
Kirk, G. P.....E. Grand Forks
Kirmse, Geo. W.....Minneapolis
Kirsch, Ralph L.....Crookston
Kistler, C. M.....Minneapolis
Kittleson, John A.....Lowry
Kjelland, J. S.....Crookston
Klein, Harry .....Duluth
Klein, H. N.....St. Paul
Knauff, M. K.....St. Paul
Knickerbocker, Frank H....Staples
Knight, H. L.....Minneapolis
Knight, R. R.....Minneapolis
Knight, Ralph T.....Minneapolis
Knight, S. G.....Randall
Knights, F. A.....Pequot
Knudtson, H. M.....Pipestone
Koch, John C.....Minneapolis
Kohler, Geo. A.....Minneapolis
Kvitrud, Gilbert.....St. Paul
Kollen, H. M.....Minneapolis
Koller, L. R.....Minneapolis
Kolset, Carl D.....Benson
Kraft, Peter .....Duluth
Kremer, Walter J.....Minneapolis
Kriedt, Daniel .....Minneapolis
Kuhlmann, August .....Melrose
Kuth, Jos. R.....Duluth

Laird, A. T.....Nopeming
Lajoie, J. M.....Minneapolis
Lamb, Harold L.....Sauk Center
Lande, Wm. B.....St. Paul
Landenberger, John...New Prague
Landeen, F. J.....Stillwater
Lane, Laura A.....Faribault
Laney, R. L.....Deer River
Langenderfer, F. V.....St. Paul
Lannin, J. C.....Mabel
Lapierre, C. A.....Minneapolis
Larsen, C. L.....St. Paul
Larsen, O. O.....Detroit
Laughlin, J. T.....Gray Eagle
Laurent, A. A.....Minneapolis
LaVake, R. T.....Minneapolis
Law, A. A.....Minneapolis
Leach, W. D.....Callaway
Leahy, Bartholmew.....St. Paul
Leavitt, H. H.....Minneapolis
Leck, Clifford E.....Austin
LeClerc, Jos. E.....Le Sueur
Lee, Thos. G.....Minneapolis
Lee, W. N.....Madison
Lee, W. P.....Northfield
Leicht, Oswald .....Winona
Leitch, Arch. .....St. Paul
Leland, J. T.....Herman
Leland, M. N.....Minneapolis
Lemon, W. S.....Rochester
Lemstrom, Jarl .....Minneapolis
Lenont, C. B.....Virginia
Lepak, John A.....St. Paul
Lerche, William.....St. Paul
Lester, C. A.....Winona
Leuty, Amos .....Morris
Lewis, C. B.....St. Cloud
Lewis, C. F.....Austin
Lewis, Edwin J.....Sauk Center
Lewis, J. B.....South St. Paul
Lewis, J. D.....Minneapolis
Lewis, W. W.....St. Paul
Lexa, F. J.....Lonsdale
Libert, John.....St. Cloud
Lichtenstein, H. M.....Winona
Liedloff, A. G.....Mankato
Lillie, H. I.....Rochester
Lima, Ludwig .....Montevideo
Lind, C. J.....Minneapolis
Linde, Herman .....Cyrus
Lindgren, E. I.....Duluth
Lindsay, W. V.....Winona
Linnerman, N. L.....Duluth
Linner, H. P.....Minneapolis
Linton, W. B.....Rochester
Lisar, G. M.....St. James
Little, J. W.....Minneapolis
Little, W. J.....St. Paul
Litzenberg, J. C.....Minneapolis
Lloyd, H. J.....Mankato
Logan, A. H.....Rochester
Logan, F. W.....Blue Earth
Lommen, A. P.....Lanesboro
Loomis, E. A.....Minneapolis
Love, Geo. A.....Preston
Lowe, L. M.....Glyndon
Lowe, Thomas .....Pipestone
Luedtke, G. H.....Fairmont
Lufkin, H. M.....St. Paul
Lum, C. E.....Duluth
Lund, S. O.....Montevideo
Lynam, Frank .....Duluth
Lynch, J. L.....Winona
Lyng, John A.....Minneapolis
Lynn, J. F..... .....Waseca
Lyon, H. R.....Rochester
Lyon, J. D.....Minneapolis
Lysne, Henry .....Minneapolis

McCann, D. F.....Bemidji
McCarthy, W. J.....Madelia
McCarthy, W. R.....St. Paul
McClanahan, J. H.....White Bear
McCloud, C. N.....St. Paul
McComb, C. F.....Duluth
McCoy, Mary K.....Duluth
McCrea, James .....Fulda
McCreight, Geo.....Albert Lea
McCuen, J. A.....Duluth
McDavitt, Thos.....St. Paul
McDonald, A. L.....Duluth
McDonald, H. N.....Minneapolis
McDougald, D. W.....Le Sueur
McDowell, J. P.....St. Cloud
McEachran, A. .....Minneapolis
McGiffert, E. N.....Duluth
McGroarty, J. J.....Easton
McHugh, R F.....Aitkin
McIntire, H. M.....Eveleth
McIntyre, E. H.....Virginia
McIntyre, Geo. .....Minneapolis
McIntyre, G. W.....St. Peter
McIntyre, John A.....Round Lake
McKeown, E. G.....Pipestone
McKibbon, H. E.....St. Cloud
McKinnon, J. J.....Wadena
McLaren, Jenetta M.....St. Paul
McLaughlin, E. M.....Winona
McNevin, C. F.....St. Paul
MacDonald, D. A.....Minneapolis
MacDonald, I. C.....Minneapolis
MacLaren, Archibald.....St. Paul
Macnie, J. S.....Minneapolis
Maercklein, Ivan R.....Renville
Maertz, Wm. F.....New Prague
Magney, F. H.....Duluth
Magnusson, Herman V.—
North Branch
Maitland, David P.....Jackson
Maland, C. O.....Minneapolis
Malmgren, C. V.....Virginia
Maloney, T. J.....St. Paul
Manley, J. R.....Duluth
Mann, A. T.....Minneapolis
Manson, F. M.....Worthington
Marcum, E. H.....Bemidji
Mariette, E. S.....Hopkins
Mark, A. E.....Rochester
Mark, D. B.....Minneapolis
Martin, T. R.....Duluth
Masson, Jas. C.....Rochester
Mattick, W. S.....Deerwood
Maurer, E. L.....Brownton
May, C. C.....Adrian
May, W. H.....Minneapolis
Mayland, M. L.....Faribault
Mayo, C. H.....Rochester
Mayo, W. J.....Rochester
Mead, Marion A.....Minneapolis
Meierding, W. A.....Springfield
Meighen, J. W.....Ulen
Melby, Benedik...Blooming Prairie
Mellby, O. F.....Thief River Falls
Melson, O. C.....Rochester
Melzer, G. R.....Lyle
Merrill, B. J.....Stillwater
Merrill, J. E.....Amboy
Merriman, L. L.....Duluth
Merritt, Geo. F.....St. Peter
Mesker, G. H.....Olivia
Metcalf, F. W.....Winton
Metcalf, J. M.....Monticello
Meyer, E. L.....Minneapolis
Meyerding, E. A.....St. Paul
Meyerding, Henry W.....Rochester
Miller, Victor I.....Mankato
Miller, W. A.....New York Mills
Millspaugh, J. G.....Little Falls
Mingo, F. E.....Hugo
Mitchell, R. S.....Grand Meadow
Moffatt, A. G.....Howard Lake
Mogilner, L. M.....St. Paul
Moir, W. W.....Minneapolis
Molander, H. A.....St. Paul
Moloney, G. P.....New Prague
Molzahn, H. E.....St. Paul
Monahan, J. A.....Minneapolis
Monahan, Robert .....Minneapolis
Moore, A. B.....Rochester
Moore, W. J.....Adams
Moorehead, Martha B..Minneapolis
Morehouse, G. G.....Owatonna
Moren, E .....Minneapolis
Mork, B. O.....Worthington
Morley, G. A.....Crookston
Morrison, A. W.....Minneapolis
Morriss, Herbert A.....Minneapolis
Morrissey, F. B.....St. Paul
Morse, M. P.....Le Roy
Morse, W. E. H.....Morristown
Morsman, L. M.....Hibbing
Mortensen, N. G.....St. Paul
Mosse, F. R.....Rochester
Moynihan, A. F.....Sauk Center
Moynihan, T. J.....St. Paul
Muehlig, G. F.....Rochester
Murdock, H. G.....Taylor Falls
Murphy, E. F.....St. Paul
Murphy, Ignatius J....Minneapolis
Murray, D. D.....Duluth
Murray, Wm. R.....Minneapolis
Mussey, R. D.....Rochester
Myers, Thos.....St. Paul

Nannestad, J. R.....Albert Lea
Nass, H. A.....Mabel
Nauth, W. W.....Winona
Neher, F. H.....St. Paul
Nelson, C. P.....Minneapolis
Nelson, H. E.....Crookston
Nelson, H. S.....Minneapolis
Nelson, L. A.....St. Paul
Nelson, M. S.....Spring Grove
Nelson, N. A.....Dawson
Neuman, G. A.....Stillwater
Neumann, C. A.....Lewiston
Neumann, W. H.....Lewiston

New, G. B.....Rochester
Newhart, Horace .....Minneapolis
Nicholson, Jos. .....Brainerd
Nicholson, M. A.....Duluth
Nippert, H. T.....St. Paul
Nippert, L. A.....Minneapolis
Nissen, Henrik .....Minneapolis
Nordin, C. G.....Brainerd
Noonan, D. F.....Minneapolis
Nordland, Martin .....Robbinsdale
Nordley, H. R.....Minneapolis
Norman, J. F.....Crookston
Noth, H. W.....Minneapolis
Novak, E. E.....New Prague
Nye, Katherine A.....St. Paul

O'Brien, H. J.....St. Paul
O'Connor, D. C.....Eden Valley
O'Donnell, D. M.....Ortonville
O'Donnell, J. E.....Minneapolis
O'Hara, J. J.....Janesville
Oberg, C. M.....Minneapolis
Oerting, Harry.....St. Paul
Ogden, B. H.....St. Paul
Ohage, Justus .....St. Paul
Ohage, Justus Jr.....St. Paul
Ohlinger, L. B.....Rochester
Oliver, C. I.....Graceville
Olson, C. A.....St. Paul
Olson, F. A.....Minneapolis
Olson, G. M.....Minneapolis
Olson, Olof A.....Minneapolis
Olson, O. H.....Erskine
Olson, R. G.....Nicollet
Oppegard, M. O.....Minneapolis
Osborn, Lida .....Mankato
Ostergren, E. W.....St. Paul
Osburn, B. F....International Falls
Onsgard, C. K.....Rushford
Onsgard, L. K.....Houston
Owre, Oscar .....Minneapolis

Palmer, W. L.....Albert Lea
Paradine, D. J.....Duluth
Parker, E. H.....Minneapolis
Parks, Albert H.....Minneapolis
Parr, L. T.....Duluth
Parrott, B. W.....Long Prairie
Parsons, George E.....Elk River
Passer, A. A.....Olivia
Patterson, W. E.....Minneapolis
Patterson, W. E.....Currie
Paulson, A. J.....Thief River Falls
Paulsen, E. L.....Minneapolis
Payette, C. H.....Duluth
Peck, L. D.....Hastings
Pederson, R. M.....Minneapolis
Pierson, Homer F.....Austin
Pemberton, J. deJ.....Rochester
Pengelly, E. J.....Ironton
Penhall, F. W.....Morton
Pennie, D. F.....Duluth
Peppard, Thos. A.....Minneapolis
Perry, C. G.....St. Paul
Perry, Ralph St. J.....Minneapolis
Persons, C. E.....Marshall
Peterson, A. C.....Dassel
Peterson, Christian .....Owatonna
Peterson, Henry E...Granite Falls
Peterson, J. R.....Minneapolis
Peterson, Thorwald....Minneapolis
Pettit, C. W.....Minneapolis
Phelps, R. M.....St. Peter
Phillips, A. E.....Delano
Phillips, J. G.....Northfield
Phillips, Wm. H.....Jordan
Pierce, C. H.....Wadena
Pilon, Pierre C.....Paynesville
Pine, A. A.....St. Paul
Pineo, W. B.....Minneapolis
Piper, M. C.....Rochester
Piper, Wm. A.....Mountain Lake
Plondke, F. J.....St. Paul
Plonske, C. J.....Faribault
Plummer, H. S.....Rochester
Plummer, W. A.....Rochester
Poehler, F. T.....Minneapolis
Poirier, J. A.....Forest Lake
Pollock, Lee W.....Rochester
Pool, Daniel.....St. Paul
Poppe, Fred. H.....Minneapolis
Prangen, A. D.....Rochester
Pratt, C. C.....Mankato
Pratt, F. J.....Minneapolis
Pratt, J. A.....Minneapolis
Preine, I. A.....Minneapolis
Pritchard, D. B.....Winona
Puffer, F. L.....Bird Island
Putney, Geo. E.....Paynesville

Quimby, Thos F.....Minneapolis
Quinn, J. A.....St. Paul
Quist, Henry W.....Minneapolis
Raadquist, Chas. S.....Hibbing
Radabaugh, Rudolph C...Mazeppa
Rains, John W.....Willmar
Raiter, F. U. S.....Cloquet
Ramsey, W. R.....St Paul
Randall, B. M.....Graceville
Rankin, A. A.....Zumbro Falls
Ransom, M. L.....Hancock
Ratcliffe, J. J.....Aitkin
Rathbun, A. M.....Rice
Ravn, Bjorne.....Windom
Rebman, E. C.....Austin
Reed, Chas. O.....Minneapolis
Rees, S. P.....Minneapolis
Reeves, C. E.....Eagle Bend
Reimstad, C. S.....Brainerd
Reiter, H. W.....Shakopee
Reynolds, Hugh W.....Hibbing
Reynolds, J. S.....Minneapolis
Rheim, J. E.....Mora
Rhimes, D. C.....Caledonia
Rice, George D.....St. Cloud
Richards, E. T. F.....St. Paul
Richardson, W. E.....Pipestone
Richardson, W. J.....Fairmont
Richmond, Chas. D.....Jeffers
Ridgeway, Alex .....Belgrade
Ridgway, A. M.....Annandale
Riggs, C. E.....St. Paul
Ringnell, C. J.....Minneapolis
Riser, R. I.....Minneapolis
Rishmiller, J. H.....Minneapolis
Ritchie, H. P.....St. Paul
Roan, Carl M.....Minneapolis
Roberts, L. M.....Little Falls
Roberts, Thos. S.....Minneapolis
Roberts, W. B.....Minneapolis
Robertson, A. W.....Litchfield
Robertson, Carl J.....Grove City
Robertson, H. E.....Minneapolis
Robertson, J. B.....Cottonwood
Robertson, W. P.....Litchfield
Robilliard, Chas M.....Faribault
Robilliard, W. H.....Faribault
Robbins, C. P.....Winona
Robinson, J. M.....Duluth
Robitschek, E. C.....Minneapolis
Rochford, W. E.....Minneapolis
Rodda, F. C.....Minneapolis
Rodgers, C. L.....Minneapolis
Rogers, J. T.....St. Paul
Rollins, F. H.....St. Charles
Rose, John T.....Lakefield
Rosen, Samuel .....Minneapolis
Rosenberry, B. P.....Winona
Rosenow, E. C.....Rochester
Rothenburg, J. C.....Springfield
Rothrock, J. L.....St. Paul
Rothschild, H. J.....St. Paul
Rousseau, Victor.....Maple Lake
Rowe, O. W.....Duluth
Rowe, W. H. Jr.....St. James
Rowntree, Leonard G..Minneapolis
Roy, Philemon.....St. Paul
Rudolph, A. J.....Waseca
Rumpf, W. H.....Faribault
Russell, H. R.....Stewartville
Rutherford, W. C.....St. Paul
Ryan, John J.....St. Paul
Ryan, W. J.....Morgan Park

Sanborn, C. R.....Bemidji
Sanderson, A. G.....Granite Falls
Sanderson, Ed. .....Minneota
Sanford, A. H.....Rochester
Sather, E. R.....Spring Valley
Savage, F. J.....St. Paul
Sawyer, H. P.....Goodhue
Schaefer, S. .....Winona
Schatz, F. J.....Rosemount
Schefcik, J. F.....Minneapolis
Scheldrup, N. H.....Minneapolis
Schlesselman, J. T.....Mankato
Schlutz, F. W.....Minneapolis
Schmidt, Gottfried.....Lake City
Schmitt, A. L.....Mankato
Schmitt, S. C.....Minneapolis
Schneider, H. A.....Jordan
Schneider, J. P.....Minneapolis
Schoch, R. B. J.....St. Paul
Schons, Edward .....St. Paul
Schottler, G. J.....Dexter
Schroder, Chas. H.....Duluth
Schuldt, F. C.....St. Paul
Schultz, J. A.....Albert Lea

Schulze, Albert G.....St. Paul
Schwartz, O. H.....Duluth
Schwyzer, Arnold .....St. Paul
Scofield, C. L.....Benson
Scott, J. W.....St. Charles
Seashore, D. E.....Duluth
Seashore, Gilbert .....Minneapolis
Sedgwick, J. P.....Minneapolis
Senkler, Geo. E.....St. Paul
Seham, M. .....Minneapolis
Senn, E. W.....Owatonna
Shannon, E. A.....Bemidji
Shannon, Sylvester .....Crosby
Shapere, A. D.....St. Paul
Shapiro, E. Z.....Duluth
Sheldon, W. D.....Rochester
Shellman, J. L.....St. Paul
Shelver, H. J.....Ortonville
Sheppard, Fred .....Hutchinson
Sheppard, P. E.....Hutchinson
Sherman, C. L.....Luverne
Sherper, Myron .....St. Paul
Sherwood, Geo. E.....Kimball
Shimonek, Anton .....St. Paul
Shrader, E. E.....Watertown
Shulean, Nellie .....Cambridge
Simison, C. W.....Hawley
Simon, B. F.....St. Paul
Simon, Geo. H.....St. Paul
Simons, E. V.....Spring Valley
Simons, Jalmar .....Minneapolis
Simpson, J. D.....Minneapolis
Sistrunk, Walter E.....Rochester
Sivertsen, Iver .....Minneapolis
Skinner, H. O.....St. Paul
Slocumb, J. A.....Plainview
Slocumb, Maude S.....Minneapolis
Smallwood, Justin T...Worthington
Smersh, Francis M.....Owatonna
Smith, B. A.....Crosby
Smith, C. C.....Carson Lake
Smith, C. E. Jr.....St. Paul
Smith, E. H.....Bemidji
Smith, F. L.....Rochester
Smith, H. R.....Minneapolis
Smith, L. G.....Montevideo
Smith, M. W.....Red Wing
Smith, Norman M.....Minneapolis
Smith, P. A.....Faribault
Smith, Wm. H.....Cass Lake
Sneve, Haldor .....St. Paul
Soderlind, A. .....Minneapolis
Sogge, L. L.....Windom
Sohlberg, Olof I.....St. Paul
Sohmer, A. E. J.....Mankato
Soper, J. E.....Minneapolis
Spalding, A. E.....Luverne
Spicer, Frank Wm.....Duluth
Spratt, C. M.....Minneapolis
Spurbeck, R. G.....Cloquet
Stachniewicz, V. J.....Winona
Stacy, Leda .....Rochester
Staley, John C.....St. Paul
Stanley, Court R.....Minneapolis
Staples, H. L.....Minneapolis
St. Clair, G. G.....Duluth
Steen, A. H.....Cottage Grove
Steiner, Irving .....Winona
Stensrud, A. .....Dawson
Sterner, E. G.....St. Paul
Steven, George .....Byron
Stevens, F. A.....Lake Elmo
Stevenson, Robt. G.....Albert Lea
Stewart, A. B.....Cloquet
Stewart, Allan M.....Owatonna
Stierle, A. Jr.....St. Paul
Stinnette, S. E.....St. Paul
Stocking, Fred F.....Milaca
Stokes, J. H.....Rochester
Stolpestad, H. L.....St. Paul
Stomel, Joseph .....Minneapolis
Stowe, A. J.....Rush City
Strachauer, Arthur C...Minneapolis
Strathern, F. P.....St. Peter
Strathern, M. L.....Gilbert
Strickler, Mary R.....Sleepy Eye
Strobel, W. G.....Welcome
Strout, E. S.....Minneapolis
Strout, G. E.....Minneapolis
Stuhr, Henry C.....Minneapolis
Sukeforth, L. A.....Duluth
Sundt, Mathias .....Hanska
Sutherland, H. M.....Ely
Sutton, C. S.....St. Cloud
Sutton, L. F.....St. Paul
Swartwood, F. A.....Waseca
Sweeney, Arthur.....St. Paul

Sweetman, R. H.....Menhaga
Sweetser, H. B.....Minneapolis
Sweitzer, S. E.....Minneapolis
Swenson, Charles .....Braham
Szlapka, T. L.....Rochester

Taft, J. O.....Minneapolis
Taft, Walter L.....Minneapolis
Tanner, A. C.....Minneapolis
Taylor, C. W.....Duluth
Taylor, H. L.....St. Paul
Taylor, Rood .....Minneapolis
Taylor, Wm. J.....Pipestone
Teisberg, C. B.....St. Paul
Tennyson, Theo. .....Minneapolis
Thabes, J. A.....Brainerd
Theissen, W. N.....Faribault
Thomas, D. O.....Minneapolis
Thomas, Geo. E.....Minneapolis
Thomas, G. H.....Minneapolis
Thomas, G. J.....Minneapolis
Thompson, Albert .....St. James
Thompson, H. H.....Minneapolis
Thompson, U. C.
Marine-on-St. Croix
Thordarson, Theo.....Minneota
Thoresen, J. H.....Buffalo
Thornby, H. J.....Moorhead
Thorson, E. O.....Luverne
Tibbet, M. H.....Duluth
Tierney, C. M.....Granger
Tilderquist, D. L.....Duluth
Tilton, A. J.....Alden
Tingdale, A. C.....Minneapolis
Tinker, C. W.....Stewart
Tofte, Josephine B.....Pine City
Torkelson, P. T.....Lyle
Townsend, De Wayne.....Belgrade
Traeger, Carl A.....Faribault
Tuohy, E. L.....Duluth
Turnbull, F. M.....Duluth
Turnbull, R. .....Fosston
Tweedy, G. J.....Winona
Tyrrell, C. C.....Minneapolis

Ulrich, Henry L.....Minneapolis
Ulrich, Mabel.....Minneapolis
Undine, Clyde Albert...Minneapolis
Urstad, O. H.....Kiester
Utley, J. D.....St. Paul

Vadheim, Alfred H.....Tyler
Valentine, W. H.....Tracy
Van Deboget, Lewis....Minneapolis
Van Slyke, C. A.....St. Paul
Van Valkenburg, B. F.—
Long Prairie
Vercellini, G. .....St. Paul
Verne, V. E.....Moorhead
Von Berg, J. P.....Albert Lea
Von der Weyer, Wm.....St. Paul
Voyer, E. O.....Minneapolis
Vrooman, F. E.....St. Francis

Waldie, G. McL.....Wadena
Walker, A. E.....Duluth
Walker, C. C.....Lamberton
Walker, G. H.....Fairfax
Walker, J. D.....Wykoff
Waller, Jos. D.....Wilmont
Walters, F. R.....Moose Lake
Wanous, E. Z.....Minneapolis
Ward, A. W.....Minneapolis
Warham, Thos. T.....Minneapolis
Warner, E. F.....St. Paul
Warren, C. L.....Le Roy
Warren, F. S.....Faribault
Warren, J. W.....Minneapolis
Warwick, Margaret ...Minneapolis
Watson, A. M.....Royalton
Watson, C. W.....Minneapolis
Watson, F. G.....Rushmore
Watson, J. A.....Minneapolis
Watson, John D.....Holdingford
Watson, N. M.....Red Lake Falls
Watson, Tolbert .....Albany
Wattam, G. S.....Warren
Weeks, L. C.....Detroit
Weinburgh, W. H.....Waterville
Weir, J. D.....Beardsley
Weiser, F. R.....Windom
Welch, M. C.....St. Paul
Welles, H. J.....Minneapolis
Wells, E. E.....Stillwater
Wentworth, Albert J.....Mankato
Werner, M. L.....Red Wing
Werner, O. S.....Lindstrom
Westby, Nels .....Madison
Weston, C. G.....Minneapolis
Weum, T. W.....Minneapolis
Whipple, C. D.....Minneapolis
Whitacre, J. C.....St. Paul
Whitcomb, E. H.....St. Paul
White, J. B.....Belle Plaine
White, J. S.....St. Paul
White, P. A.....Rochester
White, S. Marx.....Minneapolis
Whiting, Arthur D.....St. Cloud
Whitmore, F. W.....St. Paul
Whitney, A. W.....St. Paul
Whittemore, J. G.....Donnelly
Wiedow, Henry .....Worthington
Wilcox, Archa E.....Minneapolis
Wilcox, F. L.....Walker
Wilkinson, Stella .....Duluth
Will, W. W.....Bertha
Willcutt, C. E.....Minneapolis
Williams, R. J.....Pine River
Williams, C. .....St. Paul
Williams, H. O.....Lake Crystal
Williams, John .....Lake Crystal
Willius, F. A.....Rochester
Williams, Leon A.....Slayton
Williams, Robert .....Minneapolis
Williams, R. V.....Rushford
Williams, U. G.....Minneapolis
Willson, Hugh S.....Minneapolis
Wilson, C. E.....Blue Earth
Wilson, L. B.....Rochester
Wilson, W.....Northfield
Wilson, W. F.....Lake City
Wiltrout, I. Geo.....Rushford
Winberg, O. K.....Lake Park
Winnick, J. B.....St. Paul
Winter, John A.....Duluth
Wiseman, R. L.....Pine City
Witherstine, H. H.....Rochester
Withrow, M. E...International Falls
Wohlrabe, Arthur A.....Mankato
Wold, K. C.....St. Paul
Wood, Douglas F.....Minneapolis
Wood, Harry G.....St. Paul
Woodard, F. R.....Minneapolis
Woodruff, C. W.....Chatfield
Woodward, F. O.....Minneapolis
Woodworth, Elizabeth..Minneapolis
Woodworth, L. F...Le Sueur Center
Workman, H. M.....Tracy
Workman, W. G.....Tracy
Wright, C. D'a. .....Minneapolis
Wright, C. O.....Luverne
Wright, F. R.....Minneapolis

Yoerg, O. W.....Minneapolis

Zaworski, E. A.....Minneapolis
Zeirn, Thos. .....North Branch
Zimbeck, R. D.....Maynard
Zimmermann, H. B.....St. Paul
Ziskin, Thos. .....Minneapolis